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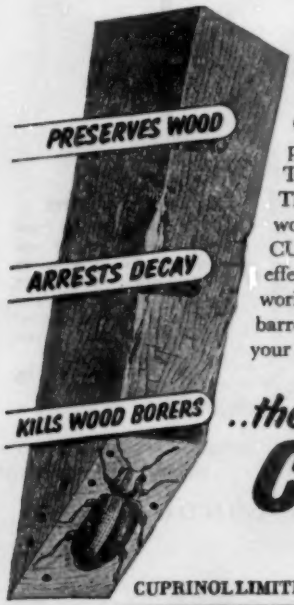

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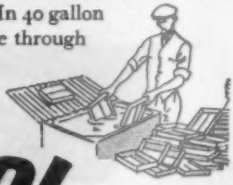

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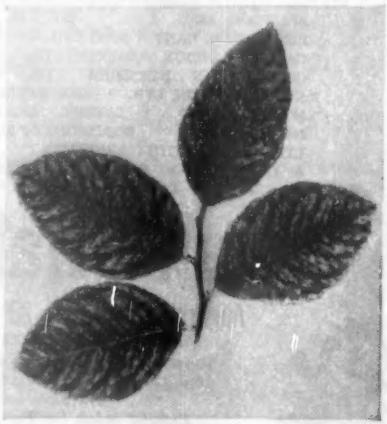

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JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

VOL. LXXX PART EIGHT

August 1955

THE SECRETARY'S PAGE

ANNOUNCEMENTS—AUGUST AND SEPTEMBER

Shows

TUESDAY, AUGUST 9 12 NOON to 6 P.M.	Fortnightly Flower Show. Gladiolus Competition.
WEDNESDAY, AUGUST 10 10 A.M. to 5 P.M.	British Fuchsia Society's Competition.
FRIDAY, AUGUST 12 12 NOON to 6 P.M. SATURDAY, AUGUST 13 10 A.M. to 5 P.M.	British Gladiolus Society's Show.
TUESDAY, AUGUST 23 12 NOON to 6 P.M. WEDNESDAY, AUGUST 24 10 A.M. to 5 P.M.	Fortnightly Flower Show.
FRIDAY, SEPTEMBER 2 1 P.M. to 7.30 P.M. SATURDAY, SEPTEMBER 3 10 A.M. to 6 P.M.	National Dahlia Society's Show.
TUESDAY, SEPTEMBER 6 12 NOON to 6 P.M. WEDNESDAY, SEPTEMBER 7 10 A.M. to 5 P.M.	Fortnightly Flower Show. Cactus and Succulent Plant Show—International Organization for Succulent Plant Study.
FRIDAY, SEPTEMBER 9 11 A.M. to 7 P.M.	National Rose Society's Show.

Shows—(*continued*)

TUESDAY, SEPTEMBER 13 1 P.M. to 7.30 P.M. WEDNESDAY, SEPTEMBER 14 10 A.M. to 6 P.M.	National Chrysanthemum Society's Show.
TUESDAY, SEPTEMBER 20 12 NOON to 6 P.M. WEDNESDAY, SEPTEMBER 21 10 A.M. to 5 P.M.	Great Autumn Show.

R.A.F. Horticultural Show. The R.A.F. Horticultural Show scheduled for September 27/28 has been cancelled.

Lectures

TUESDAY, AUGUST 9, at 3 P.M. "Insect Life in the Soil," by PROF. H. W. MILES, D.SC.

TUESDAY, SEPTEMBER 6, at 3 P.M. "Autumn Bulbs for Garden and Cold-house," by MR. E. B. ANDERSON.

TUESDAY, SEPTEMBER 20, at 3 P.M. "Agapanthuses," by THE HON. LEWIS PALMER, F.L.S., V.M.H.

Demonstrations at Wisley—The following demonstration will be given at Wisley, that on the second day being a repetition of that given on the first.

Vegetable Garden

SEPTEMBER 28–29. Digging, Trenching, Manuring and Composting. (Commencing at 2 p.m.)

Film of Australian Wild Flowers—MR. B. L. CHAMBERS, a Fellow from New Zealand, will show a film of the flora of Western Australia, taken during a journey by car in 1953, in the Lecture Room, New Hall, at 3 p.m. on Wednesday, August 10. Fellows of the Society are cordially invited to attend.

Chelsea Show, 1956—Attention is drawn to the fact that in 1956 the Chelsea Show will be held on May 23, 24 and 25. The private view for Fellows and Associates will be on May 22.

The Society's Examinations—The Preliminary Examination for the National Diploma in Horticulture will be held on Saturday, December 3, 1955. The closing date for entry is October 1, 1955.

Pamphlets—The following will be published during August and may be obtained upon application to: The Secretary, The Royal Horticultural Society, Vincent Square, London, S.W.1.

Hardy Herbaceous Plants for the Border. By J. B. Paton. Price 1*s*. 6*d*., postage and packing, 3*d*.

Synonymy in Lettuce Varieties. By L. E. Watts. (Reprinted by kind permission from the 5th Annual Report 1954 of the National Vegetable Research Station, Wellesbourne, Warwick.) Price 1*s*. 6*d*., postage and packing, 3*d*.

NOTES FROM WISLEY

J. B. Paton

By August we expect the half-hardy plants to be at their best, and this year the portion of the annual border devoted to these plants contains some forty different varieties of annuals which have been raised from seed sown under glass in March and planted out in late May. For those Fellows not possessing a heated glasshouse it may be of interest to know that many of these annuals quite easily may be raised by sowing in mid April in either a coldhouse or frame. With this later start, however, it will not be possible to set out the plants until June. There are also other half-hardy annuals, for example cosmeas and zinnias, which may be sown directly into the open ground in late April or early May. This last method is that adopted for the trials of these two plants which are in progress this year. It would appear at the present moment (mid June) that the trial of cosmeas will be quite successful as the seed of most varieties germinated well, and the seedlings have made good progress. The outlook for the zinnias, however, is not so hopeful as the cold nights of May played havoc with the young seedlings and it is doubtful whether this trial will prove really satisfactory as only about a quarter of the strains have a reasonable stand of plants.

Once again it is to the family Compositae to which we turn for a good proportion of the plants in the border and one of the first plants to catch the eye is *Tagetes* 'Golden Gem.' *Tagetes* is given the common name of either African or French marigold even though it is a native of Mexico. *T.* 'Golden Gem' is a selection from *T. tenuifolia* var. *pumila*, the striped Mexican marigold, and is a dwarf compact plant with deep golden-yellow flowers. Close by is a double mixed gaillardia which is derived from *G. pulchella* of Louisiana and Arizona. In passing we may note that the herbaceous perennial gaillardia is derived from *G. aristata*. Another popular plant is the China aster, whose various strains have been bred from *Callistephus chinensis*, and at Wisley there may be observed this summer 'Triumph of the Market' with 6-inch diameter flowers of ostrich plume type and a single-flowered multicoloured variety.

Of the South African composites there is a wide range to be seen in

the border. A special mixture of *Ursinia* has extremely showy flowers in shades of yellow and orange which appear freely from July to September. Unlike many South African plants these remain fully open throughout the day. This plant likes an open position in well-drained soil and should the site be very sunny quite good results can be obtained by sowing *in situ* in May. *Senecio elegans*, the annual cineraria introduced from South Africa in 1700, has rosy lilac blooms, while the strain represented in the border is a mixture of pale yellow, apricot, lavender-mauve, and rosy-lavender. Also notable is the selection of the South African *Arctotis grandis*, growing to 2½ feet in height and having blooms in white, ivory and cream shades, many with rich orange zones and attractive bright blue discs, and others with burgundy-red markings. Near by are some dwarf hybrid venidiums which only grow to a height of 15 inches and which have petals in shades of yellow and orange, marked at the base with red. *Venidium fastuosum* is a taller-growing plant with orange, purple-black zoned flowers. *Dimorphotheca aurantiaca* in the wild is a perennial shrub, but in this country, is usually treated as a half-hardy annual, either being sown under glass in late March or sown in the open in late April; it has gorgeous orange flowers throughout the summer.

While considering South African plants we would draw attention to a small collection of them which is planted on the west side of the Alpine House. Here may be seen *D. barberiae*, which has, on long stalks, flower heads composed of bright purple ray florets 1 inch long and dull purple on their undersides. It is easily raised from seed, but its dwarf form should be propagated vegetatively, for seeds saved from this form only produce the taller plant. There are also the closely related *Osteospermum caulescens* and *O. jucundum*. The latter has only been at Wisley about 18 months and although it did not flower freely last summer, in a better summer results may be different. Note also *Felicia natalensis*, sometimes known as *Aster erigeroides*, with its pink or light purple ray florets. Likewise from S. Africa is the half-hardy perennial *A. pappei* which, however, can be treated as an annual and used for bedding, for which its bright blue flowers make it particularly attractive. Within this collection is included a member of the Scrophulariaceae, *Diascia barberae*, which is reported to be an annual, although at Wisley it has survived for six years and has never set seed. The flowers have two spurs and are rose-pink in colour with a central blotch of green.

Back again in the Annual Border the family Scrophulariaceae is represented by *Nemesia strumosa* selections, which include 'Orange Prince' a rich orange-yellow, 'Blue Gem' a forget-me-not blue, and 'Triumph' in mixed colours. All these are compact plants; the large-flowered strain of *N. strumosa* known as 'Suttonii' has a more straggly habit. Of *Antirrhinum*, the snapdragon, there are two strains, 'Crimson Velvet' with large flowers of currant-red carried on many spikes which form a bushy plant 18 inches tall, and 'Pink Freedom' with rosy-pink

flowers on a dense bushy plant 22 inches tall. This latter is a rust-resistant variety and it is a pity that at the moment there are no rust-resistant strains available in this country in the deeper colours. *Alonsoa warscewiczii* is represented by a compact plant with scarlet flowers and narrow dark green foliage.

Phlox drummondii (*Phlox* is a member of the family Polemoniaceae) always makes a good mass of colour in any bedding scheme and is an easy plant to grow. The original deep rose-coloured species was collected in Texas by Thomas Drummond, who sent the seed to this country in 1835. In the Wisley border there are two mixed strains, one growing to a height of 1 foot and the other to only half this height. 'Pink Beauty' is a dwarf compact plant some 6–7 inches high, which is invaluable for edging a border.

Of more spreading habit, especially late in the season, are the petunias (of the family Solanaceae) and these also are suitable for growing in the front of the border. We may observe an improved form of 'Rose Queen' with intense shining rosy-pink flowers up to 3 inches in diameter and also a single large-flowered rose variety. These large-flowered or grandiflora types are more suitable for cultivation in a glasshouse, as the large blooms are so easily damaged by the wind and the rain. *Nicotiana affinis*, the tobacco plant, is more correctly known as *N. alata* var. *grandiflora*, and has long white sweetly scented flowers, and in some gardens is perennial, as buds arise from thick roots which survive the winter.

Other plants from a variety of families include *Cleome* 'Pink Queen,' which has interesting and unusual flowers; each has four petals and six long spidery stamens 2–3 inches long and hence the common name "Spider Plant." This particular variety is derived from *C. spinosa*, a denizen of the West Indies and neighbouring countries. Close by is *Anchusa* 'Blue Bedder,' which grows some 18 inches high and has vivid indigo-blue flowers which make a good contrast with the neighbouring giant pink verbena. Verbenas make attractive cut flowers for interior decoration. There is also the white-eyed, royal blue verbena. Still in the blue shades are the taller-growing *Salvia farinacea* 'Blue Bedder' and *Echium* 'Blue Bedder' at 12–15 inches in height. At the same height and with a profusion of scarlet flowers is *Cuphea miniata*. The sea lavender, *Limonium* (*Statice*) *sinuatum*, is another useful plant for the half-hardy border and the blooms are also most effective, when dried, for winter decoration.

Although it is not possible to mention individual strains until after the trials have been judged, Fellows' attention is drawn to the trials of begonias, cosmeas, and zinnias, which should be in full bloom this month. The begonias are strains of the semperflorens type with fibrous roots. The trial was sown on February 2, pricked out into boxes on April 4, gradually hardened off and planted into open ground on May 31. The trial is now growing away well after a slight check due to the cold nights of early June.

PLANTS OF INTEREST AT WISLEY DURING AUGUST

ENTRANCE AND LABORATORY WALLS

Abelia × *grandiflora*
„ *schumannii*
Campsis grandiflora
Perovskia atriplicifolia

GLASSHOUSES

Achimenes in variety
Begonias in variety
Cassia corymbosa
Coleuses in variety
Haemanthus coccineus
Hibiscus rosa-sinensis
Medinella magnifica
Nerium oleander
Platycerium bifurcatum
Tibouchina semidecandra

FRAMEYARD WALL

Ceanothus 'Autumnal Blue'
„ 'Henri Desfosse'
Clematis rehderiana
Magnolia grandiflora

WILD GARDEN

Cyclamen neapolitanum
Cyrilla racemiflora
Gentiana asclepiadea
Hydrangeas in variety
Oxydendrum arboreum
Tropaeolum speciosum

SEVEN ACRES

Buddleias in variety
Heather Garden
Gunnera manicata
Hypericums in variety
Spiraeas in variety

WEATHER HILL

Rose Border
Annual Border

AWARD OF GARDEN MERIT COLLECTION

Ceanothus 'Gloire de Versailles'
Eucryphia glutinosa
Fuchsia magellanica var. *riccartonii*
Romneya coulteri
Rose 'Fellemberg'

ROCK-GARDEN AND ALPINE HOUSE

Acaena buchananii
„ *microphylla*
Amaracus pulcher
Carlina acaulis var. *caulescens*
Crassula cooperi
„ *sarcocaulis*
Gazanias in variety
Gentians in variety
Gilia californica
Hypericum 'Rowallane Hybrid'
Leucojum autumnale
Nertera granadensis
Phlox carolina
Polygonum affine
„ *vaccinifolium*
Thalictrum kiusianum
Trichinium manglesii
Tunica saxifraga pleniflora
Zauschneria californica

FLORAL TRIAL GROUNDS

Trials of Begonias
„ Chrysanthemums
„ Cosmeas
„ Dahlias
„ Gladioli
„ Zinnias

VEGETABLE TRIAL GROUNDS

Trials of Summer Cabbages
„ Sweet Corns
„ Vegetable Marrows

THE PUBLIC AND THEIR GARDENS

Charles Eley, M.A., V.M.H.

Veitch Memorial Gold Medallist 1953

THERE are in Britain and in Ireland some gardens upon which much knowledge has been lavished and money expended that seem fated to disappear. These gardens are not necessarily eminently suitable for public use, yet they have a definite claim for preservation partly because in themselves they are extremely beautiful and partly because they contain fine specimens of plants that can be seen only in a few places in these islands.

The particular beauty and interest of such gardens is not supplied by even the best of our municipal gardens nor can they be properly described as being botanical gardens. The following notes are a plea for the preservation of a few of the very best of such gardens which it is claimed possess characteristics and beauty that will not be found in municipal gardens unless in future the taste of the general public should change.

In September 1954, SIR DAVID ECCLES, speaking, as Minister of Works, in reference to the temple of Mithras at Walbrook, was reported as saying "Public support should now be more forthcoming for the care of churches, abbeys, palaces, castles and country houses." In November of the same year SIR ALAN LASCELLES, Chairman of the Historic Buildings Council for England, said: "The prospect for historic houses seemed to be heavy with clouds: nor was it simply a question of money, the more serious threat to the future of these houses was social rather than financial; it looked as if the nation might run short of something more precious than money." I make no doubt that both SIR DAVID ECCLES and SIR ALAN LASCELLES would agree that their pleas and their comments were intended to be regarded as equally applicable to the immediate surroundings of the buildings that are the particular care of both these speakers.

These gardens and pleasances would seem to demand a degree of knowledge and judgment that is certainly rarer if not greater than the skill required for the essential preservation of an historic building: there is good reason for this claim. Those whose duty it is to preserve the great buildings of the past have at their disposal a wealth of professional advice, a store of past experience, and the splendid existing standing examples that go back to the earliest days of civilization.

It seems best to begin by attempting some explanation of the problem. The gardens and pleasances that have come or are likely to come into public custodianship can be classified roughly as being either formal or informal in design and can, of course, be a mixture of both; but it is with the large informal, landscape, wild, or park-like garden that these notes are chiefly concerned.

The writer can remember hearing WILLIAM GOLDRING (1854–1919), when in the heyday of his career as a garden architect, saying: "Any competent architect could be trusted to design a formal garden with some help from a good local nurseryman but laying out a landscape garden was quite another fish to fry." To the attentive young beginner this dictum seemed to be not merely an exaggeration but a positive inversion of the truth yet he suspects that many eager garden-makers share the same illusion?

Practical consideration will produce the conclusion that in general the upkeep of formal gardens will be chiefly a question of money and if the lay-out is good the attraction can be maintained by the standard of service that is to be found in the best examples of existing public municipal gardens.

But within recent years a situation of an entirely different kind has arisen and has caused owners of large informal gardens (anxious that the amenity of these national treasures should be preserved) to arrange for public trustees to undertake the care of such gardens and to provide endowment for the maintenance. The acceptance of such trusts will produce problems far beyond the question whether the available funds will prove adequate. The kind of large garden that the writer has in mind may or may not be attached to a section of ancient horticulture, but its main interest and great value consist of a large informal enclosure that has been planted with trees and shrubs within the last 100 years. These gardens, however large, have no share in the megalomania that is associated with LE NOTRE (1613–1700), nor with the ruthless monotony of "CAPABILITY" BROWN (1715–1783), and of his follower HUMPHREY REPTON (1752–1818).

To the earliest gardens of the type in mind it is not easy to fix exact dates: they have been widely but inaccurately regarded as having been originally instigated by WILLIAM ROBINSON * (1853–1935) as a result of his book *The English Flower Garden* (1883), but some gardens of this kind were in existence long before the appearance of that book.

That remarkable gardener JAMES HENRY MANGLES (1832–1884) described in the *Gardeners' Chronicle* for June 11, 1881, a visit he had recently paid to Lamorran Rectory (then existing near Truro), where REV. THE HON. JOHN TOWNSHEND BOSCAWEN had constructed a garden in 1850. The writer can add that Cornish people, themselves garden-owners, who remembered this garden, told him that MR. BOSCAWEN was the first Cornishman to "plant shrubs in grass." It may well be that elsewhere there were forerunners of MR. BOSCAWEN.

Of such a garden it has been written: "It is more wonderful and more compelling each time it is visited. It holds its sway . . . because its appeal is in no way a direct one; its splendours dazzle without being

* WILLIAM ROBINSON in *The Parks and Gardens of Paris* (1867) had extolled what he called "natural gardens." Contrary to a common misconception ROBINSON was the editor of *The English Flower Garden* rather than its author; he was an inspired journalist who utilized his knowledge to exploit both fashion and his own particular preferences.

resplendent . . . because the beauty is effortless, presents no challenge and so provokes no comparisons."

If the history of such a garden is unreliable or too scanty it will be a safe guess to assume that these large gardens were, in each case, the creation of two persons—the master and the man. To the master the garden was the mainspring of his leisure, no matter how crowded nor how fateful the rest of his time may have been; the man was absorbed by his work and by the extent of the contribution that he was able to make towards the successful culmination of his master's ideas. Both knew that the garden was transitory; so it was the vision of its future rather than the existing form that occupied the minds of each of them in tune with their respective capacity.

The price of such gardens, like that of liberty, is vigilant foresight.

It seems reasonable to apply to these gardens the verdict SIR ALAN LASCELLES fears will await famous houses, and the inevitable result be that the private maintenance of these gardens will become ever rarer ; if any of them are to survive some sort of outside assistance will become increasingly necessary. Unlike the historic houses the gardens under consideration have been constructed since 1850. It is of interest to note that this period (1850–1950) of British private gardens is nearly coincident with the formation and development of the Royal Botanic Gardens at Kew.

There seems little available evidence of much close connection between Kew and such large private gardens as were constructed between 1850 and 1870. Indeed, during that period the organization of British horticulture was declining and in 1859 The Royal Horticultural Society, founded in 1804, was in serious financial difficulty and, sad to tell, sold its library and superb collection of original drawings to reduce the debts.

But the purpose of these notes is not a history of either Kew or The Royal Horticultural Society, both of which have been fully dealt with elsewhere. The intention is to emphasize the amateur character of the woodland type of large garden that, here and there, was coming into being in Britain and in Ireland. The plant collecting in India and China for which SIR JOSEPH HOOKER (1817–1885) and JOHN REEVES (1779–1856) were directly or indirectly responsible resulted in these private garden-owners receiving gifts of new plants and thereby a valuable and exciting addition to the enthusiasm that already existed. It can, I think, be properly said that, following the plant collections of ROBERT FORTUNE (1812–1880), of the great French missionaries, and of E. H. WILSON (1876–1930) the next great event, arousing to new activity British amateur gardeners, was the publication (1914) of *Trees and Shrubs Hardy in the British Isles*, by WILLIAM JACKSON BEAN, a monumental book that consolidated the interest created by the plant collecting instigated by concerted amateur efforts which began in 1904 with the expeditions of GEORGE FORREST (1873–1932) and were continued by REGINALD FARRER (1880–1920), FRANK KINGDON WARD, and others.

BEAN'S book successfully achieved for the tree and shrub amateurs

what, in 1883, ROBINSON'S *English Flower Garden* had done with considerable effect for herb gardeners. Some of those gardens have, like that of Lamorran, already disappeared, others exist under difficulties, all run some risk of demolition which, even if gradual, will be complete unless effective action is taken; unlike famous buildings it is not possible to restore quickly by skilful expenditure of money the ravages of neglect. If it be admitted that at least some of these essentially British gardens should be saved, it remains to decide upon which of them it would be wise to incur expense and what practical steps should be taken to preserve their main features. It is reasonable to fear that the amount of available public money is likely to be small. Therefore it seems wise that those folk who place great value upon the preservation of that woodland type of garden which is the object of these notes should take counsel and strive to produce a policy that will help to defeat the two great foes—fashion and finance, which have made the houses unwanted and the gardens too costly. There do not exist a large number of such gardens and the process of sifting will disclose that for one good reason or another there probably will remain comparatively few upon which public money can wisely be spent.

In a good many cases the space for these gardens was originally obtained by making a clearance in existing woodlands * and gradually enlarging it as the work proceeded. Unless a planting of suitable evergreens was made whenever the garden was extended the time will almost certainly arrive when age will cause shelter to become inadequate and great damage will be threatened: without doubt, unless the shelter is adequate and capable of being maintained at a cost that the custodians can provide, the venture is likely to prove a troublesome one; before it is too late this danger must be averted by sound advice and the provision of sufficient money to act upon it. Might not this money be wisely provided from some external fund? If this safeguard is taken in time it need be neither expensive nor elaborate. The maintenance of a pleasance is, above all, a gradual process but not a static one; it is the stitch in time that, above all, the trustees of public gardens will have to bear in mind as being their guide to success. When the time arrives to consider whether or not to undertake the care of a garden the primary matter to investigate is the condition and maintenance of the shelter: the amount of shade required is a different matter and in most cases will probably prove to be adequate or capable of being provided at small cost. The best method of reinforcing existing shelter is always a matter demanding knowledge and experience. If the shelter belt is formed by

* An event of much significance but at the time attracting little public notice was the formation (1905) by Magdalen College, Oxford, in their woodlands at Tubney, near Oxford, of a forestry arboretum in conjunction with the English Forestry Society, of which the Society's President WILLIAM ROGERS FISHER and HENRY JOHN ELWES were the moving spirits. This venture, managed by a joint committee of the College and the Society, throve greatly and published (1915) a remarkable list of its contents. This arboretum, the first of its kind in Britain, was, like many other good causes, nearly extinguished by the effects of the First World War.

ancient woodland of a good depth it may be possible to reinforce it by under-planting with a conifer of which red cedar (*Thuja plicata*), Douglas fir (*Pseudotsuga Douglasii*) and western hemlock (*Tsuga heterophylla*) seem likely to be sound choices; * the trees can be fronted by evergreen plants such as holly or laurestinus or evergreen oak in accord with such expert advice as may be obtainable. The removal of some of the old trees should also be considered under advice. It can be surmised that at the outset all successful woodland gardens have been planted densely (there are famous instances of failure due to the neglect of this procedure) and omission to reduce the density in good time may have resulted in overcrowding sufficiently serious to disfigure any garden beyond redemption within any reasonable period of time; a point that prospective custodians will do well to consider carefully before deciding to take over; it may prove a contentious matter to decide the amount of clearance necessary and also the cost in effect and in money of so doing.

It is essential to keep clearly in mind that properly the type of garden under discussion is neither an arboretum nor a botanical garden but is an area constructed to express the maker's ideas of peaceful interest and beauty: for the welfare of such gardens knowledge is likely enough to prove a greater need than money. It should be accepted as an axiom that periodically expert advice will be needed. The amount of any fee paid should be substantial: the pittances paid in the past have resulted in the destruction of incentive to acquire the necessary mass of knowledge and experience.

For the purposes of average town-dwellers the well-kept ordinary municipal garden, with its wide paths, numerous clean seats, the masses of "colour" maintained as long as possible throughout the year, the company and the children that are so important a part of such "company," and frequently the existence of a bandstand, all these features in combination will surely form attraction far outweighing in popularity any garden of which the appeal is based upon peace, calm and beauty, "all seasons and their change,—all please alike." † Yes, indeed, but as yet, not equally so to all people.

The decision as to what will constitute the requisite accessibility and capacity to afford sufficient attraction for visitors at once brings to the forefront the question whether it will ever be possible to maintain successfully a large garden without some sort of outside assistance. This, indeed, seems to be a woeful confession but unless this new and

* The extent to which any particular conifers deplete or rejuvenate soils does not appear to have been scientifically investigated and is a type of observation that is greatly needed. By many British foresters the Norway spruce is accused of being a "soil robber." In the West of Britain the leaves of Monterey pine (*Pinus radiata*) are widely regarded as being poisonous to most vegetation and the trees are said at times to exude matter deleterious to many shrubs: on the other hand the late DR. FREDK. STOKER used to declare that the leaves of Scots pine (*Pinus sylvestris*) benefited the plants in his famous rock garden at Loughton, near Epping. Amongst British foresters Douglas fir is by many regarded as a "soil improver."

† Milton, *Paradise Lost*, Book IV, line 640.

difficult problem is confronted with extreme frankness these notes are unlikely to prove of any practical value to those for whom they have been put together.

In future it will be a matter of great difficulty to obtain the services of a trained gardener; the only training grounds for "real" gardeners are likely to be the few Botanic Gardens and Wisley and there is hope that the munificence of the late Reginald Cory may enable Cambridge University to take a substantial share in this training. But it seems unlikely that bright boys will choose gardening as a career; for them there will be little room and insufficient incentive.

Some owners who struggle to maintain large gardens (or who hope to occupy some day a site upon their family property) may possess or can acquire the knowledge requisite to transform their costly gardens into some form of arboretum if they are sufficiently skilful and bold enough to withstand a charge of vandalism. In this connection it may be well to add a warning that too often attempts to commercialize private kitchen gardens result in proving the space available to be either too large or too small. Everyone will hope that a good measure of success will attend the efforts of all those who decide to "carry on" and continue stoutly to refuse to consider realism the same as pessimism, yet it is difficult today to feel optimistic about the fate of an arboretum or large private garden when it seems that few people will be able to afford room for even one large tree; actually, comparatively few people realize how much space is occupied by a large tree. It is, of course, true that the popularity and practice of horticulture is increasing, the membership and attendances at the R.H.S. is evidence of this, and it is true also that a number of exceedingly interesting small gardens have been constructed and will thrive so long as the requisite knowledge and care is maintained but such collections of small treasures will collapse "in next to no time" when these ideal circumstances change.

As these matters stand today it seems the only machinery existing for the salvation of a large garden or of an arboretum * is operated by the National Trust whose proclaimed function "is to preserve suitable properties for the benefit of the community, members and non-members alike. The need to support the National Trust by members and by money was never greater than it was today," and it is much hoped that readers of these notes will support the Trust and enable it to preserve adequately and skilfully the chief examples of our national horticultural and arboricultural heritage. For this particular purpose it is essential to call for public attention, early decision and for prompt action whenever the fate of living things is involved. Speaking generally, buildings, if given some attention, can be left in safety until such time as appropriate action is able to be taken; trees and shrubs cannot be left without

* Apropos of large trees, the recently formed (1952) *International Union of Dendrology* is evidence that our European neighbours, alive to a difficulty likely in the future, hope by taking combined action to facilitate the distribution of seed and the knowledge of uncommon trees.

careful, perhaps drastic attention and it may prove a contentious matter to decide wisely the amount of clearance desirable, but also the cost in effect and in money of so doing.

Above all, please spare a generous helping of sympathy for the expert whose duty it may be to advise and from whom will be expected answers to problems on which no immediate nor confident decision can surely be made and in regard to some of which the more he has learnt the more he doubts whether anyone can as yet produce a satisfactory answer. Above all, he expects that his advice will be questioned and criticised by enthusiastic members of the general public whose ignorance of the subject seems to him almost incredible: the unfortunate truth of this was demonstrated by the unrivalled experience of DR. WILFRID FOX, V.M.H., as expressed in his lecture on road-side planting and published by the London Society. Therefore no one will envy the National Trust the task it is asked to undertake nor grudge any help it can get from The Royal Horticultural Society or elsewhere.

But if the multifarious duties of the horticultural section of the Trust are to be crowned with success it is well to stress the necessity of proceeding speedily with the selection and care for the chief of those large arboretum type of gardens which it is much hoped it will prove possible to preserve: it may be that there are not many which can wisely be salvaged and for which funds will be available but they constitute a priceless manifestation of special interest.

Examples of the complexities and difficulties can be seen, if only in miniature, in the parks, squares, and open spaces of London; recognition and understanding of these if widely spread, ought to go a long way towards achieving that support for the National Trust which is greatly needed.

It is to be hoped that the National Trust will secure in some form the support of County and District Councils adjoining any garden selected and that the public will see the wisdom of maintaining modestly, but adequately, these astonishing heritages that at present* remain unrivalled elsewhere in the world.

* Since writing the above it has become known (*The Times*, 12 February, 1955) that the late MR. PIERRE S. DUPONT has bequeathed and endowed with about 50 million dollars the Longwood Foundation, which will include the Longwood Garden near Philadelphia, for "public inspection, education, and enjoyment." The area is about 50 acres. Development of the estate as an arboretum was begun about 1900 by two brothers named PIERCE. MR. DUPONT acquired it in 1906.

GLASSHOUSE DESIGN AND MANAGEMENT

W. J. C. Lawrence, O.B.E., V.M.H.

(*Lecture given on April* 5, 1955, MR. G. L. PILKINGTON *in the Chair*)

GLASSHOUSES have been used for a great many years in a great many places. We might, therefore, conclude that all the important problems of design and management have been solved by the accumulated experience of growers. Broadly speaking, I believe this was the point of view of the majority of glasshouse growers and builders up to the beginning of the last world war. Design was satisfactory—at least, so far as it affected plant growth and cropping—and there were no questions to ask.

Certainly I had no questions to ask: along with other folk I accepted glasshouses more or less as I found them. Then in the course of some observations on the winter growth of glasshouse plants, I decided I ought to investigate the correlation of light with growth. I borrowed a light-meter and, as a side-line, compared light intensity inside the glasshouses with that outside. I found that the inside light intensity was often no more than 50 per cent. of that outside.

This was startling. To the eye, which is remarkably adaptive to light intensity, the difference was practically imperceptible. To the plant, the effects of this loss of light were clearly all-important, for during the winter half of the year I knew that under average glasshouse conditions plant growth was roughly proportional to light intensity. Clearly, we could no longer accept glasshouses as we found them: improved design should give improved light admission. And what about orientation and heat and ventilation and humidity? Might there not also be some unexpected revelations on these aspects of climate?

Perhaps nothing new would be found: nothing that would lead to reconsideration of glasshouse design. But unless investigations were made—*for there was no scientific evidence whatever*—we should not even know if improvement was possible. In particular it was necessary to discover the relative importance of the various factors of design and of the components of climate; then we should be able to say what was worthwhile and what was not from the practical point of view.

It was with this in mind that research into glasshouse design and climate was begun at the John Innes Horticultural Institution. The necessity of building new glasshouses at Bayfordbury greatly accelerated the investigations and now after three years' intensive work by my colleague, MR. R. M. WHITTLE, enough can be seen of the general picture to enable us to anticipate, with some confidence, the final conclusions. It would be out of place for me to attempt to discuss this afternoon any of the technical details of the work at John Innes. All I shall do, therefore, is to present in a practical way the bare outlines of the problems or conclusions.

First, let us be clear about the meaning and application of the word

"design." Design can be considered under four headings: (1) glasshouse structure; (2) glasshouse site; (3) glasshouse shape, and (4) glasshouse climate. Of these, glasshouse climate claims the greatest attention since it is not only determined by the other three factors but profoundly affects management.

SOLAR RADIATION

The easiest approach to an understanding of these factors of design is to consider an empty, unheated, unventilated glasshouse as affected by solar radiation. It is the visible part of the solar spectrum that is concerned with plant growth and glass transmits more or less equally the energy of different wavelengths in the visible range. But glass also transmits energy of wavelengths shorter and longer than the visible spectrum and these take part, along with light, in the heating of the glasshouse. Thus, solar radiation not only supplies light to the glasshouse but heat, and light and heat are by far the most important components of glasshouse climate. We shall, therefore, look first at glasshouse design in relation to light and heat from the sun.

Glasshouse Structure

Glasshouses are expensive buildings and we expect them to have a long life: they must be strong and durable. These characteristics can be had with both wood and metal houses and are mainly a matter of engineering which I do not propose to discuss. What has become apparent from our investigations is the need for structural designs which, while possessing the requisite strength, obstruct as little radiation as possible. In other words, the structure should be slender as well as strong.

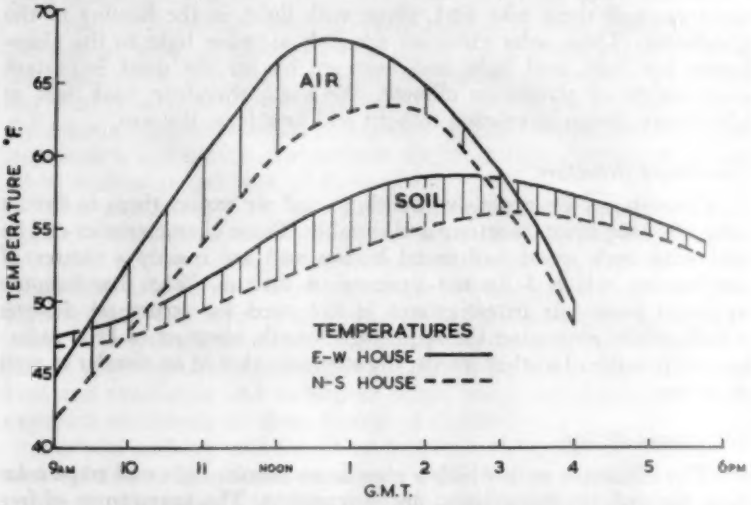
Glasshouse Siting

The efficiency with which a glasshouse admits light and traps solar heat depends on its exposure and orientation. The importance of free exposure, away from the shadow of trees and buildings, is self-evident. The part played by orientation is not so evident, though of consequence for the single, detached glasshouse. Orientation is of maximum importance in the winter half of the year, October to March. It is of no importance when the sky is overcast, neither is it of much consequence during the summer months when, usually, there is ample light for good plant growth.

The first evidence on the benefits to be had from selective orientation came from two different sets of calculations made for me in 1946 and 1948. Both calculations showed that an east-west orientation was far superior to a north-south one, from October to March. This superiority, however, referred to sunshine only and we have to remember that the sun shines for only a fifth of the average winter day. Indeed, the total of diffused light is twice as great as that of sunlight on the average winter day.

The fact that diffused light is of greater value than sunlight in winter, and that its transmission cannot be calculated, means we have to resort to continuous measurement of combined sunlight and daylight, or use plants as integrating photometers. In either case, identical houses are required, one east-west, the other north-south, a facility which has not been made available anywhere yet. However, with the houses we have at Bayfordbury we have been able to get some factual information, partly by direct measurement of light but mainly indirectly by recording temperature rise in the glasshouse as influenced by incoming radiation.

Thus, starting at day-break, the rate and degree of increase in air and soil (2 inches deep) temperatures in one of our large east-west houses is markedly greater than in a comparable north-south house (Text Fig. 1).



TEXT FIG. 1—This diagram shows the effect of orientation on glasshouse temperatures on a sunny winter day, 12th November. The higher temperature recorded in the east-west house implies that light intensity was also higher. Each of the two houses was in the middle of a group of houses; if they had been detached houses the temperature (and light) differences would have been still larger.

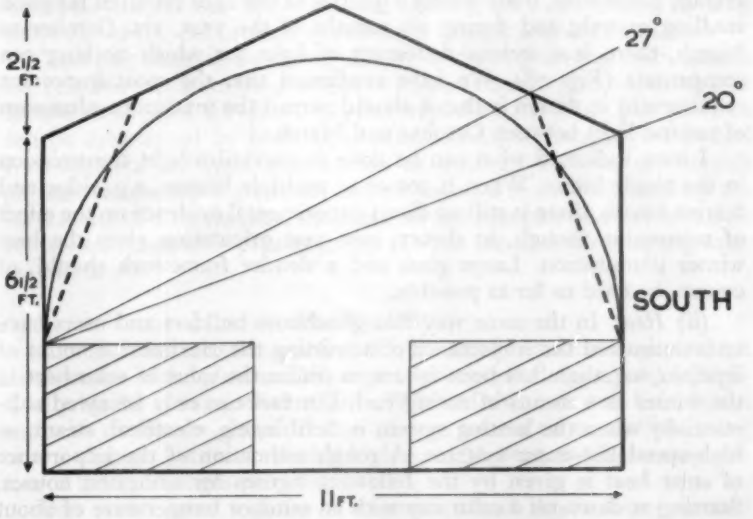
Again, measurements have shown that an hour's sunshine in mid-winter has about twice the heating value in our modern east-west propagating house as in the conventional north-south house, a clear indication of the superiority of east-west orientation together with the use of large glass.

Another aspect of siting concerns the level of the house. It is traditional to arrange for a lengthwise fall in the gutters to assist the disposal of roof water. But one end of the house is then higher than the other with the consequence that the warm air flows to the high end, thus

establishing an incurable and uneconomic temperature gradient. I see no reason why glasshouses should not be built on the level, especially now we have improved heating systems. The gutter might have to be re-designed but that is a small matter compared with loss of temperature control in the house which slopes.

Glasshouse Shape

I have shown that the transmission and utilization of solar radiation in single glasshouses is markedly affected by their structure and siting, especially orientation. A third factor is the shape (section) of the glazed portion of the house. Shape is of little importance in a north-south house but, theoretically, it is of some consequence in the transmission of radiation in the east-west house when the sun is shining. The difficulty is to assess the value of shape as a *supplement* to good structure and siting. Ideally, the south-facing portion of a 10–12 ft. wide east-west propagating house should be an arc whose radius originates at bench level on the north side. In practice, it may well be that a 6–7 ft. high glass side (vertical or sloping) with an even span roof is as good, or nearly so, since the rays of light from the sun when it is low in the sky (e.g. 5°–20° elevation) penetrate the *side* with minimum loss and illuminate the whole width of the house (Text Fig. 2). At higher



TEXT FIG. 2—In a detached east-west house, the shape (cross-section) affects in minor degree light intensity and distribution within the house. Three arbitrary profiles are shown: semi-circular, vertical sides, sloping sides. The importance of a high side, whatever the shape, in admitting low-angle sunlight will be evident from the diagram. The ideal profile for diffused light is, approximately, the semi-circular one.

elevations, the sunlight is transmitted with greater efficiency by the roof than the side.

Again, we can make the roof of uneven-span shape with the steeper roof facing north or south. With a steep south roof, the shadow from the ridge and ventilator members is thrown on part of the house and much sunlight is lost when the sun's elevation is somewhat higher than the slope of the north roof. With a steep north roof these disadvantages do not arise. It is impracticable to measure with photometers the complex consequences of altering the shape of a house. Experiments being carried out at certain Experimental Horticulture Stations suggest that *glasshouse* shape may be of practical significance. One thing, however, we can be certain of: a freely exposed single house built with large panes of glass, a slender structure, east-west orientation and high sides will be very highly efficient in transmitting solar radiation, any benefit from roof shape being an additional refinement.

Glasshouse Climate

It will now be clear that the climate of a glasshouse is largely determined by its structure and siting. Both of these control the amount of light and heat in the house, especially in the winter months.

(i) *Light.* On an average day in December and January, in the average glasshouse, there is only a quarter of the light required for good seedling growth; and during six months of the year, viz. October to March, there is a serious deficiency of light for which nothing can compensate (Fig. 78). We have confirmed that the most important requirement in design is that it should permit the maximum admission of natural light between October and March.

I have indicated what can be done to maximize light transmission in the single house. When it comes to multiple houses, e.g. ridge and furrow blocks, there is still no direct experimental evidence on the effect of orientation though, in theory, east-west orientation gives the best winter illumination. Large glass and a slender framework should, of course, be used as far as possible.

(ii) *Heat.* In the same way that glasshouse builders and users have underestimated the importance of admitting the maximum amount of light, so, too, there has been failure to realize the value of solar heat in the winter as a means of saving fuel. But fuel can only be saved substantially when the heating system is flexible, e.g. electrical, steam, or high-speed hot-water systems. A rough estimation of the importance of solar heat is given by the following figures for unheated houses. Starting at dawn on a calm day with an outdoor temperature of about 40° F., each increase of 30–40 lumens per square foot (foot-candles) in light intensity inside the house is accompanied by an increase in temperature of 1° F., equivalent to a saving of 3–5 per cent. in fuel consumption. On many sunless winter days, light intensity in a well-designed glasshouse may rise to 400 to 500 lumens sq. ft., i.e. solar heat

can make a contribution equivalent to the amount of fuel required to raise the temperature 10–15° F.

In our modern propagating house, a sunny day in January can reduce the daily (24 hours) heat consumption by 20 per cent. For the whole month, the corresponding value is 10–20 per cent.

GLASSHOUSE HEATING

This is a whole subject in itself and I only propose to mention it in outline. As I have already stated, a heating system must be highly flexible to secure the maximum use of solar heat. This means the system must be controlled thermostatically by the ambient temperature of the glasshouse and have a low thermal capacity, i.e. the pipes must cool rapidly when solar heat "comes on" and *vice versa*. In other words, fire heat and solar heat must be complementary with very little overlapping. Only three types of heating systems satisfy this last requirement; electrical, steam, and high-speed hot-water, in order of flexibility.

Our experiments have shown that with a wind velocity of about 20 m.p.h. (or lower in some cases) the heat requirement doubles. This suggests that, complex as the problem may be, the use of windbreaks should be investigated as a means of saving fuel. We have also established that the heat loss in a house due to ventilators which do not fit tightly may rise from the normal 10 per cent. to nearly 20 per cent. of the total loss for the house by heat transfer and air change, a sharp reminder of the importance of ventilator design and maintenance.

There appears to be no significant additional loss of heat from a house when pipes are used overhead instead of near ground, so long as the overhead pipes are spaced 3–4 feet from the roof. Thus, pipe position can be determined by crop requirement alone, without regard to fuel consumption. By good distribution of heating pipes in the correct pattern, temperature gradients can be reduced to 2–3° F., and by the correct use of a thermostat, the mean air temperature of a house can be controlled at less than plus or minus 1° F. in the absence of strong solar radiation.

VENTILATION

Ventilation in glasshouses occurs (1) naturally by air change through the overlaps of the glass and through ventilators and doors, and (2) artificially by the opening of ventilators. We find that in a well-built house with the ventilators closed, the air change rate in calm weather is 0·5 to 1·0 changes per hour. With a high wind blowing the figure may rise to 2·0 to 2·5 changes per hour.

One result from a series of experiments at Bayfordbury showed that the rate of change through partly opened ridge ventilators could be increased three to four times by opening bottom ventilators. I regard this as an important pointer. For example, it means that one could conserve heat and avoid draughts in a propagating house by eliminating side ventilators and installing box or other ventilators of adequate size and

number in the walls. I must say, however, that the average box ventilator does not fit at all well and I suggest that glasshouse builders might like to give some thought to designing a tight-fitting bottom ventilator which does not warp or jam. In passing, I might say that there seems to be little prospect of using fans to ventilate any but the smallest houses.

CONDENSATION

It is well known that, other things being equal, water vapour will more readily condense on metal than on wood, owing to the greater thermal conductivity of metal. It has been argued from this that an inherent defect of metal houses is condensation drip from the roof. This is untrue. In a well-designed metal house, as in a well-designed timber house, condensation will be of no consequence.

The rules for the prevention of damage by condensation are the same for all types of glasshouse: (1) the roof slope must not be less than about 25° from the horizontal, (2) condensation that forms on the ridge ventilators must be able to run down on to the outside of the roof, and (3) the flow of condensation down the glass and roof bars must be unobstructed by horizontal structural members.

GLASSHOUSE SIZE

Before I conclude my lecture I wish to draw attention to a problem which can only be appreciated in the light of all that I have mentioned. I refer to glasshouse size. This is a major factor in the control of glasshouse climate. As will be seen from Table I, inherent disadvantages are associated with extremes of size. The amateur can do little about this: the size of the house must be small because his financial resources are small. But the commercial grower should give serious thought to the question of size. My firm opinion is that the optimum area for the

TABLE I

The Effect of Size on Glasshouse Climate and Management

	Small house, e.g. amateur	Large house, e.g. ridge and furrow block
Light admission	very good	moderate
Heat loss	high	low
Temperature fluctuations	rapid	slow
Ventilation	good	poor
Humidity	tends to be low	tends to be high

multiple ridge-and-furrow type of glasshouse block (e.g. tomato and carnation houses) lies between ¼ acre and ½ acre, the optimum length about 150 ft. and the breadth of each house comprising the block about 30 ft. Both climate and management get out of control in large glasshouse blocks and the wastage of man-hours is apt to be high.

MANAGEMENT

At this point the question might very well be asked: what has all this got to do with the management of glasshouses? The answer is, nearly everything. Good propagation, good growing and good cropping depend on good climate—on good light, correct temperatures, and so on. With a good climate, more than half the difficulties and problems of plant management disappear and growing becomes easy. It also becomes less costly in money, labour and time. Our experiments show that these facts have never been sufficiently appreciated, mainly because they concern such intangible factors as light and heat and air movement.

Our experiments also show that no dramatic changes of glasshouse design are to be expected. But, *and I would especially emphasise this*, substantial improvements are now possible in the use and control of light and heat and the sum of these improvements may have pronounced, even dramatic, effects on the management of plants and crops.

There are a great many glasshouses with heavy construction, small glass, cumbersome and uncontrollable heating systems and poor ventilation. These call for as much effort, skill and cost to rear healthy plants as is required by a dark and insanitary slum to rear healthy children. Correct design results in a glasshouse that is as different from a near slum as is a modern, self-contained flat, and is as easy to run.

In the old days, with the old type of glasshouse and traditional methods, 100 seeds would be sown to get ten plants and ten plants grown to produce one specimen plant. Labour and materials were cheap and abundant, and plants had to be nursed along. Today, labour and materials are dear and often scarce. One hundred seeds are expected to give 80–100 plants, all of them potential specimens. It is now established from both experiment and practice that given glasshouses of superior design and with a climate that is properly controlled, plants will not need nursing along. They will "grow themselves."

E. A. BOWLES (1865–1954), THE MAN AND HIS GARDEN

PART II

William T. Stearn

In December 1912 BOWLES received from R. HOOPER PEARSON, editor of the *Gardeners' Chronicle*, a letter which said: "I am thinking of a small series of books which will give expression to an idea that was presented to me a little time ago. There would be three (or perhaps four) volumes, 'My Garden in Spring,' 'My Garden in Summer,' 'My Garden in Autumn.' The idea would be to have them literary and popular. In speaking to some of my friends on the subject several have asked me to invite you to write one or more volumes." Thus originated BOWLES's celebrated *My Garden* volumes (1914–1915). In them he takes the enquiring visitor round his garden as it was in 1914; he chats at length and with innumerable amusing digressions about individual plants and groups of plants, open-handedly sharing the results of his experience, never ostentatiously airing his scholarship, but often revealing it as when he notes, for example, that the longest word in the Greek lexicon, ὀρθροφοιτοσυκοφαντοδικοταλαίπωροι, was invented as a maledictory imprecation against sparrows; thus he covers so much ground and deals light-heartedly but authoritatively with such a range of plants that the three volumes have a reference as well as an entertainment value. They immediately won the commendation of such good and diverse judges as H. J. ELWES and REGINALD FARRER and they retain their interest despite the passage of time. FARRER received the first two "chintsey tomes" in April at Siningfu in upper Kansu, north China. Evidently he put aside his beloved Jane Austen and after four days of "pure unalloyed and ever increasing delight" he wrote to BOWLES that "your two vols. are about as nearly perfect of their kind as anything could be . . . showing how a gentleman can wear his garb of knowledge with a gay air and humour, dignified yet easy and whimsical and personal." Months later FARRER's enthusiasm remained undimmed. "Take my delight as very solid," he wrote in December to BOWLES, "whatever it be worth: it is not 4 days of it I have had but many more; the 2 chintzy volumes were among the very few selected to accompany *all* my wild wanderings: camped amid *Mec[onopsis] quintuplinervia* their spell was as great as ever and many are the Thibetan abbots they have rejoiced with their plates. 'Aya,' cry these holy men, 'behold, here are flowers!' and all the little acolytes and scholars come running exactly like old-fashioned fuchsias in their swathed scarlet robes above their short and very voluminous petticoats of richest violet." *My Garden in Spring* has chapters devoted to early irises, snowdrops, spring crocuses, primulas, anemones and tulips, as well as such garden features as the "lunatic

asylum" (a collection of trees and shrubs with abnormal characteristics, such as the twisted hazel, the oak-leaved laburnum, the ring-leaved willow and other oddities), "Tom Tiddler's Ground" (a collection of plants with golden or silvery or variegated leaves) and the rock garden. *My Garden in Summer* includes chapters on irises, roses, geraniums, succulents, grasses, daisies, flowers for cutting, etc. *My Garden in Autumn and Winter* provides chapters on autumn crocuses, colchicums, ferns, etc. Only a botanist-gardener with very catholic tastes could have produced a work of this scope and lasting interest. This three-volume tour begins with a discussion on when does spring commence; it ends with the garden in the grip of winter and its gardener stating his horticultural credo: "If only the owner of a garden will plant enough plants of the most different types and habits procurable, there ought to be never a day in which he cannot find some pleasure in watching growth or decay, structure of bud, leaf, blossom, fruit or stem, no minute of the daylight hours of the working days in which there is no interesting and health-giving work to be done; and no bed of the garden that will not provide some offering for a friend, whether it be cut flowers, ripe seeds or divisions of roots. That is my idea of what a garden should provide for its owner and his friends. . . . I only wish to show how much pleasure I have derived from this by no means remarkable garden and to encourage others somewhat similarly circumstanced to collect and grow plants of all kinds, to watch and note their peculiarities, mark their charms and hand on the best of them to others who love a plant for its own sake."

About 1923 Messrs. Martin Hopkinson planned a series of handbooks on genera of garden interest, to be written by acknowledged experts, which would present the main botanical and historical facts about these genera in a pleasing and readily intelligible manner and also give details of cultivation from first-hand experience. BOWLES undertook one on Crocus, which had occupied his attention for so many years that he always called the genus his "first garden love." He began to collect and paint Crocus species about 1895, and by 1901 (according to *Revue Horticole* **73**: 228) he grew no less than 135 named kinds. His first botanical publication was a description of *Crocus niveus* published in 1900. To round off the *Handbook*, the publishers insisted at the last moment that it should also include Colchicum, in which he was by no means so interested then; he obliged by quickly writing some thirty extra pages. *A Handbook of Crocus and Colchicum for Gardeners* appeared in 1924. The second edition came out in 1952, a bigger book with more pictures and printed in a smaller type, so that it contains much more information than the first edition. This 1952 book is BOWLES'S most important contribution to horticultural and botanical literature. It represents the results of nearly sixty years' interest in crocuses. Unfortunately, BOWLES's eyesight began to worsen considerably in 1939, and by 1945 he was almost blind. He had accumulated a mass of notes but could not find his way among them. Nevertheless, his

memory for detail remained keen and accurate, which made his physical failing all the more irksome to him. Thus the preparation of this new edition was a slow and often tedious business, but in April 1952 it at last reached publication. He gave his magnificent collection of paintings of crocuses to the British Museum (Natural History) shortly before his death.

In 1931 Messrs. Hopkinson asked BOWLES to write a similar book on daffodils. It appeared in 1934 under the title *A Handbook of Narcissus*. As he states in the preface, "This book represents an attempt to collect information scattered in the works of earlier writers and to present it in a handy form, correlated with observations made on wild hillsides, in gardens and museums, and at flower shows. It embodies the experience gained during over thirty years' work for The Royal Horticultural Society and more than forty years as an active gardener." The original manuscript and pencil drawings for this work, together with BOWLES's paintings of narcissi, are now in the possession of The Royal Horticultural Society.

That book on narcissus turned him aside from one he had long ago planned on anemone. In 1911 he published in *The Garden* a series of articles on "The fascination of the anemone" and a long chapter about anemones forms part of *My Garden in Spring* (1914). "There is a charm in the simple form of a single anemone that goes straight to my heart," he wrote. "The central boss of carpels, and the surrounding ring of innumerable stamens, start the flower on pleasantly concentric curves, then the segments of the coloured floral whorl are generally so ample and delightfully hollowed that their outlines are always bold and good." This aesthetic delight in anemones led him to study the more showy and horticulturally interesting groups, such as *Anemone pavonina* and allies and the so-called "Japanese anemones," in preparation for a monograph, but to postpone consideration of their more humble relatives. A realization of the difficulties involved seems to have caused him about 1930 to abandon the monograph project and to attempt a less ambitious handbook instead, since the herbarium work necessary for a monograph was not to his taste. This anemone handbook likewise came to nothing, although he got together an immense pile of notes and rather miserable dried specimens and he partly drafted some chapters. The failure of his sight and war conditions then imposed a severe handicap on further progress. During the war, while on embarkation leave, I discussed plans with him for completing the book—the falling of bombs made this seem then very optimistic—and on my return from Burma in 1946 I lived with him for some weeks getting on to paper the fruits of his long acquaintance with the genus. His material proved very patchy, but he dictated all he could remember about particular species, which often was very extensive. Despite his eighty-one years he was full of energy and enthusiasm; we usually began about 10 A.M., having spread out our material on a long trestle table in the morning-room, and we worked fairly continuously until 11 P.M., with occasional strolls in the

Photo, A. F. Kersting

FIG. 72—Sheffield Park, nr. Uckfield, Sussex. Rhododendrons beside the middle lake. This garden has recently been taken over by the Gardens Committee of the National Trust and the R.H.S. and is now open to the public

Photo, A. F. Kersting

FIG. 73—Trees and shrubs beside the middle lake at Sheffield Park

Photo, E. Giddens

FIG. 74—Old Enfield market cross in the rose garden of Myddelton House, the New River in the foreground

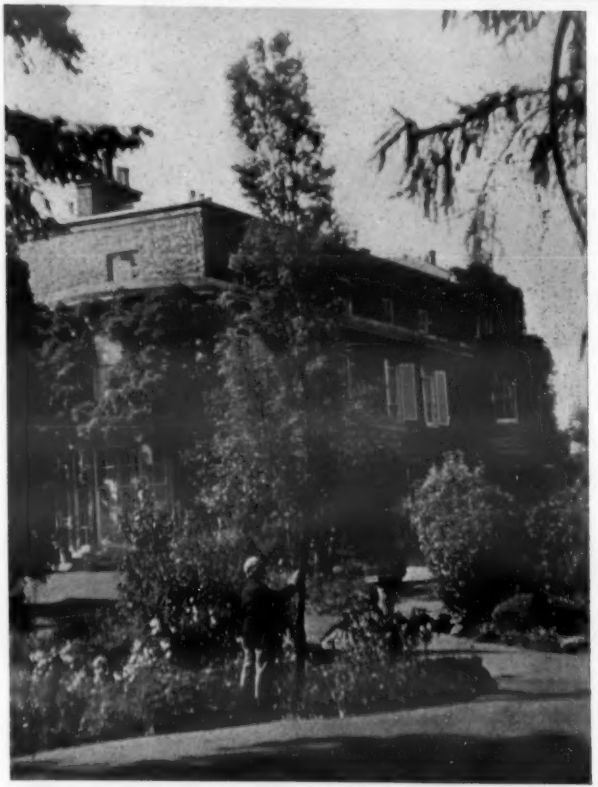


FIG. 75—Mr. E. A. Bowles beside a tree of *Robinia pseudacacia fastigiata* in the garden at Myddelton House

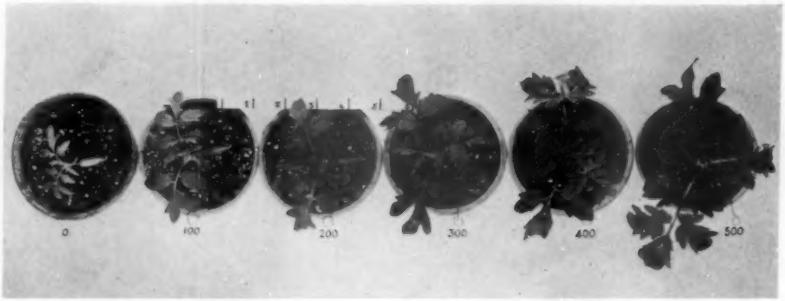
E. A. BOWLES (1865–1954), THE MAN AND HIS GARDEN

Photo, R. A. Malby

FIG. 76—*Cyclamen neapolitanum* in the garden at Myddelton House

Photo, J. E. Downward

FIG. 77—*Cytisus* × *beanii* F.C.C. May 3, 1955. This plant was exhibited by the Director, Royal Botanic Gardens, Kew (See p. 385)



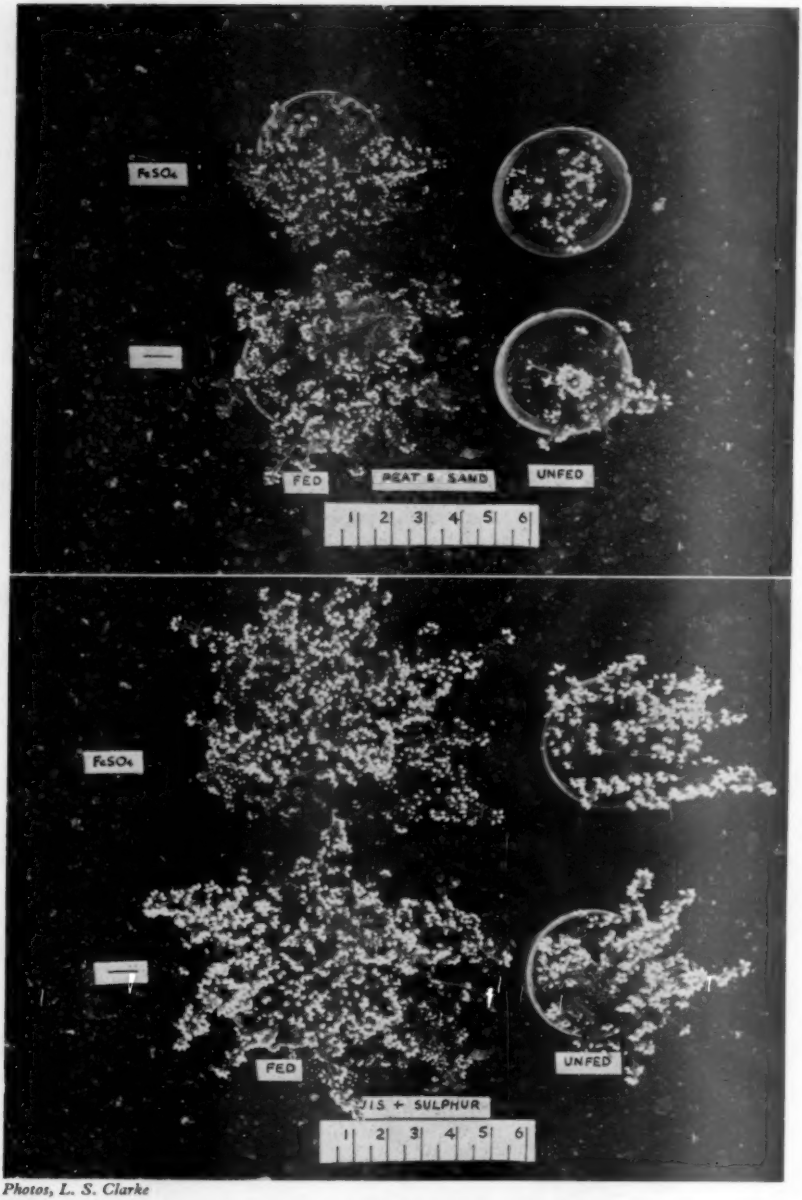
GLASSHOUSE DESIGN AND MANAGEMENT

FIG. 78—The increase in growth of tomato seedlings obtained by increasing artificially the amount of winter light. Seedlings illuminated ten hours a night for twenty nights and photographed when three weeks old. This illustration emphasizes the deficiency of natural light in the winter months (See p. 362)

Photo, L. S. Clarke

ADAPTING JOHN INNES COMPOSTS TO GROW ERICAS

FIG. 79—Effects of iron and manganese sprays on chlorotic ericas, October 14, 1953 (See p. 379)



Photos, L. S. Clarke

FIG. 80—(*above*) Growth of *Erica gracilis* var. *alba* in compost of rhododendron peat and Cornish sand. November 29, 1954

(*below*) Growth of *Erica gracilis* var *alba* in JIS(A). November 29, 1954

(See p. 379)

Photo, J. E. Downward

FIG 81—*Tritonia crocata* 'Princess Beatrix' **A.M.** May 24, 1955. This plant was exhibited by Messrs C. G. van Tubergen Ltd. (See p. 385)

Photo, J. E. Downward

FIG. 82—*Rhododendron davidsonianum* **F.C.C.** May 3, 1955. This plant was exhibited by Lord Aberconway and The National Trust (See p. 385)

garden to find living plants. It was a happy and creative time for both of us, in which I had frequent occasion to admire his wide knowledge and retentive memory, his remarkable ability to grasp essentials without any visual aid, his meticulous insistence on finding the right word. Unfortunately, it had to end before the job was done. The demands of other work pushed the completion of the anemone manuscript into the background, but he had put into it all of which he was then capable. By-products of this activity were our two papers in *J. R. Hort. Soc.* **72:** 261–268, 297–308 (1947); **73:** 57–68 (1948).

BOWLES's interest in Snowdrops (*Galanthus*) was likewise of long standing. He published a note on *Galanthus imperati* in *The Garden* of May 25, 1907, and had already built up a collection through his friendship with snowdrop-fanciers of the time, notably ELLACOMBE, BURBIDGE and SAMUEL ARNOTT. Thus when in later years the application of a name was questioned, BOWLES as the heir to tradition could speak with an authority based on detailed first-hand knowledge preserved by a retentive memory. In 1909 the REV. JOSEPH JACOB, writing in *The Garden* (**73:** 315; June 26, 1909) about "Myddelton House, its garden and its gardener," said: "Let us now suppose the day is wet or that one is tired, very probably you will be invited into MR. BOWLES'S sanctum—a small room lined from top to bottom with botanical and gardening books, rare and everyday, old and new. But it is not these that I have brought you there to see; it is to ask him to show you his beautiful sketches of snowdrops. . . . He is trying to collect and picture all the known forms, and his series of sketches will be of great historical interest." His interest in the genus persisted; a chapter on snowdrops in *My Garden in Spring* (1914) and a valuable profusely illustrated paper in *J. R. Hort. Soc.* **43:** 28–36 (1918) belong to his middle period, and later his interest was fanned to new intensity by the proposal of COLONEL F. C. STERN to publish an account of them and the allied genus *Leucojum*. His *Galanthus* notes and illustrations are now the property of The Royal Horticultural Society.

BOWLES's life-membership of The Royal Horticultural Society cost him £26 5*s*. in 1897. His annual subscription thus worked out in the end at about 9*s*. a year! Actually he gave the Society far more than he received, his services being so many and various that one can do no more than indicate some of them here; for a time he was active on no less than eight R.H.S. Committees in addition to the Council. Invited to the Scientific Committee in 1902, when SIR JOSEPH HOOKER was Chairman, he became Vice-Chairman in 1907 and Chairman in 1933 as successor to SIR DAVID PRAIN; he served on it to his death. In 1907 he became a Trustee of the Lindley Library, which had been acquired in 1867 to replace the Society's library so unhappily sold in 1859. In 1910, when the Council of The Royal Horticultural Society took over the duties of the Trustees, BOWLES thereupon became a member of the newly formed Library Committee and in 1939 he followed E. A. BUNYARD as its Chairman, an office he held until his death, which thus cuts the last

personal link with the old Lindley Library and its Trustees. His knowledge of botanical and horticultural literature made him a valuable member of the Publications Committee, and it was his insistence upon the need for a new edition of PRITZEL'S *Iconum botanicarum Index* (1855–60) that ultimately led the Society to sponsor in 1918 the compilation of STAPF'S *Index Londinensis to Illustrations of Flowering Plants etc.* (1929–31). He became a member of the Narcissus and Tulip Committee in 1904 and its Chairman in 1911. In 1908, when he was forty-two, he became a member of the Council of the Society, on which he served from 1908 to 1926 and from 1928 to his death, the rule that after five years' service a Council member retires for at least a year being set aside by his colleagues, who insisted time after time that he should continue to give the Council the benefit of his experience for another period. Towards the end of his life, council and committee work, which he was loth to relinquish, laid upon him a heavy burden. He felt duty-bound to study minutes and agenda but, these being confidential, he felt equally bound not to have them read to him. Blind in his right eye and able to see but little with the other, he would nevertheless slowly and laboriously go over these bulky documents word by word, holding the paper only a few inches from his nose. It speaks volumes for his tenacity that he always attended a meeting with the essential features of the agenda firmly in mind. He received the Society's highest honour, the Victoria Medal of Honour, in 1916; he was elected a Vice-President in 1926; in 1923 the Society presented him with the Veitch Memorial Gold Medal and in 1926 dedicated to him volume 151 of the *Botanical Magazine* "as a token of appreciation and gratitude." Formal acknowledgment from further afield of his horticultural work came in 1952 when the American Plant Life Society awarded him its 1953 William Herbert Medal.

Although disliking changes in established botanical nomenclature he was too honest to attempt the suppression of facts. He accordingly inserted in the second edition (1952) of his *Crocus and Colchicum* a chapter by MR. B. L. BURTT on the nomenclature of *Crocus vernus*; its conclusions he disliked, but he felt it a privilege, nevertheless, to make this scholarly work available. In 1910, BOWLES, with DR. A. B. RENDLE, represented the Society at the Nomenclature Subsection discussions of the International Horticultural Congress held in Brussels. The best method of naming the multigeneric hybrid groups created by orchid hybridists was then a major problem, since the procedure initiated by MAXWELL T. MASTERS of compounding a name, such as ×*Philageria* (for *Lapageria* × *Philesia*), from the names of the parent genera was leading to such long and awkward combinations as ×*Dialaeliocattleya* (for *Cattleya* × *Diacrium* × *Laelia*). BOWLES gave much thought to this problem. Finding that *-ara* (as distinct from *-iara*) had rarely formed the ending of generic names, he proposed that such multigeneric hybrid groups should be given a conventional name made by adding the termination *-ara* to the name of a person eminent as a collector, grower or student of orchids. Thus *Potinara* represents *Brassavola* × *Cattleya*

× *Laelia* × *Sophronitis*. The Royal Horticultural Society's Committee and the Brussels Congress approved this, which has become the standard procedure among orchid-raisers. It was thus a pleasure to report to BOWLES after the Stockholm International Botanical Congress of 1950 that I had been instrumental in adding to the *International Code of Botanical Nomenclature* (as part of Article H.4) the procedure he had originated some forty years earlier!

BOWLES's ability and knowledge and his readiness to serve led to his election on to the governing committee of several other institutions, notably the Council of the John Innes Horticultural Institution, on which he represented The Royal Horticultural Society from March 1927 until April 1939, when he resigned. The Chelsea Physic Garden, founded in 1676, was dear to him on account both of its historic associations and the important function it still has of providing London with botanical material for teaching and research. As a representative of the London Parochial Charities he attended a meeting of the Committee of Management for the first time on December 9, 1920, and visited the Garden for the last time on January 12, 1954, having been its Chairman from December 1945 onwards in succession to his cousin SIR WILLIAM JOB COLLINS. It is fitting that, by the generosity of his heir, MR. DEREK H. PARKER BOWLES, many books from his library have now gone to augment the collection formed by the Apothecaries Company which in 1953 was returned to the Garden for the use of students. For some years he also represented the Middlesex County Council on the Committee of Management for the Cheshunt Experimental and Research Station.

In 1918 his father, HENRY C. B. BOWLES, died, bequeathing him the contents of Myddelton House, an adequate income and a life-interest in the property. For nearly thirty years E. A. BOWLES had managed the garden, which now legally became his, and had changed it gradually. The house itself, however, had always been the domain of his mother CORNELIA, a dear old lady who died in 1911, and as she had left it, so he kept it, a mid- or late-Victorian period piece, with no central heating, no telephone, no electric light, no gas light, illuminated by oil lamps and candles and kept fitfully warm by wood fires. Both drawing-room and morning-room, with their big glass chandeliers suspended from the ceiling, were delightful survivals of the Victorian age, the drawing-room particularly so; a grand piano stood in one corner, the walls were covered with mirrors and pictures, every inch of mantelpiece and shelf space carried vases, knick-knacks, etc. BOWLES himself lived a simple life in his big house. He never married. He used for his bedroom the smallest and darkest room on the first floor, probably the one he had had as a boy, and few visitors who gazed at the curved stairway having its walls covered with flower-paintings by him, FRANK GALSWORTHY, SIR HERBERT MAXWELL and FARRER, but mostly by himself, can have guessed how many pleasant rooms it led to. The great dining-hall was never used and became a lumber room. BOWLES mostly entertained his guests in the library, where long ago, according to tradition, HENRY CARINGTON

BOWLES used to entertain CHARLES LAMB, and with the big polished table throwing back the light of the candles on to the glass-fronted book-cases and his old butler attentive in the corner of the room, the scene was probably much the same as then. His liking for the old ways led him to use a horse-drawn brougham up to 1929 when visiting Enfield, and for many years, summer and winter alike, he always wore an old straw hat.

The decline of BOWLES's eyesight from 1938 onwards made him increasingly dependent upon his faithful retainers and friends. His personal needs being few, the Second World War (which he insisted on calling "Hitler's War" to distinguish it from "the Kaiser's War" of 1914–18) affected him chiefly by taking away younger members of his staff, by making it difficult for him to visit old friends and them to visit him and by restricting severely the activities of The Royal Horticultural Society; moreover, he naturally felt much anxiety for the fate of his many younger friends on active service. For himself he had no fear. Although forty or so high-explosive bombs and numerous incendiary bombs fell in the neighbourhood, shaking his house and breaking windows but leaving intact the big Victorian vases upon the mantelpiece and the cabinet where they had stood for over fifty years, he probably found his greatest vexations in the numerous lengthy war-time documents and forms which as a landowner, householder and farmer he had to complete but could scarcely read! Moreover, his garden staff being much reduced, weeds everywhere struggled, with ever-increasing success, for mastery over the ornamental plants he had taken so long to collect.

After the war BOWLES again became engrossed in a multitude of tasks, although his partial blindness added so much to the difficulty of them all. Physically he was full of energy. Arriving one summer evening at Myddelton House I found that, although well past his eightieth birthday, he had spent most of the day wading about his pond in a bathing dress to supervise the weeding and thinning of his water-lilies and other aquatics! He became very ill during the winter of 1950–1. Although he recovered amazingly during the summer, from then onwards his strength waned and his physical infirmities made him at times so impatient and sharp-tempered that those who did not know him well were nettled by his biting remarks, in which, however, there was never any malice and for which he was so often sorry immediately afterwards. Luckily his mind retained its clarity and power. He was ill again in the winter of 1953–4, but, although very weak and needing strong arms to support and guide him about The Royal Horticultural Society's halls, he was determined to come up whenever he could, to play his part in Committee and Council. His last visit was on April 13, 1954. He attended the Council meeting at midday and presided over the Library and Scientific Committee meetings in the afternoon. There was no weakening of his spirit but he had grown very very frail and bent. On April 27 he collapsed and nine days later he died. He suffered discomfort but no great pain during these last days. When I visited him on Sunday morning, May 2, 1954, he had become very weak and he

tired quickly, but his mind was lucid and our conversation ranged as he willed over a great variety of subjects, for he was many-sided.

It was in keeping with the range of BOWLES's interests and his wide circle of friends, the affection and high regard in which he was held, that about 300 mourners, among them representatives of some fifteen institutions and societies, attended the funeral service at Forty Hill Parish Church. A sheaf of flowers from The Royal Horticultural Society's Gardens, Wisley, surmounted the coffin, but at his special request there were no other flowers. The service was followed by cremation at Enfield Crematorium and in accordance with his instructions his ashes were scattered over his rock garden.

In his later years BOWLES expressed many generous intentions, notably relating to the disposal of his books. To three institutions, the Lindley Library of The Royal Horticultural Society, the British Museum (Natural History) and the Chelsea Physic Garden, he had indicated his desire that they should receive selections of books from his library, but in his will he had made no provision for this. Thanks, however, to the generosity of his great-nephew and heir, MR. DEREK H. PARKER BOWLES, all three institutions have received the books intended. The house and gardens have become the property of the University of London School of Pharmacy in accordance with an agreement made before his death. The Zoological Society of London now possesses most of his paintings of dead birds and mammals. Of his coveted flower paintings many have passed into private hands but the Crocus and Iris paintings have gone to the British Museum (Natural History) and the Narcissus and Galanthus paintings to The Royal Horticultural Society.

The death of E. A. BOWLES has broken one of the last direct links with the great amateur horticulturists of late-Victorian times, with H. N. ELLACOMBE, C. WOLLEY DOD, ELLEN WILLMOTT, H. J. ELWES, and others. In his gardening tastes he most resembled ELLACOMBE and ELWES. Of ELWES he wrote: "It is difficult to define the qualities which made his influence so powerful, but those that impressed me most were the width of his knowledge, his love of accuracy and his untiring energy and generosity"; these were also his own qualities, as they were ELLACOMBE's, and therein lay a strong bond between them. As a botanist he belonged to the tradition of A. H. HAWORTH and WILLIAM HERBERT. In most callings his ability would have won him distinction, but it is easiest to see him as a country clergyman, like WILLIAM HERBERT, H. N. ELLACOMBE or W. W. WILKS, or the headmaster of a great public school, or a university professor. Family circumstances made him a public-spirited country gentleman keenly interested in natural history and gardening. He was the heir to traditions of public service and high standards of competence no less than to wealth and land deriving from several lines of shrewd cultured men influential in the business of their times, and he proved worthy of this heritage. Like his cousin, SIR WILLIAM J. COLLINS, he spent so much of his time helping so many other people and spread his energies over so many activities that he never reached in any one such a

height of attainment as did, for example, his other cousin, EDWARD TREACHER COLLINS, who specialized in ophthalmology, but the community needs both types for its well-being and, even though the gods may perhaps have been too prodigal with their gifts, he did not waste them. In gardens throughout the British Isles there are good plants whose ancestors once flourished under BOWLES's care at Myddelton House; his publications will long give pleasure and information, while those who knew him will always cherish the memory of his genial and sterling character. Lest it should be thought that, in bringing together these notes on his long and beneficial life, affection has given a false perspective, it seems fitting to conclude with some words about him from a letter written by a Californian botanist and horticulturist: "In America he was held in the highest esteem by myself and all others who knew him personally or came into indirect contact with him through his writings. To us he ranked among the best that England could produce."

(In preparing this sketch I have drawn upon my personal recollections of E. A. BOWLES and his garden over the last twenty-five years; his unpublished fragment of autobiography; information from MR. H. EDELSTEN; unpublished letters of REGINALD FARRER and R. HOOPER PEARSON; manuscript pedigrees of the GARNAULT, TREACHER, BOWLES and FERRYMAN families; E. A. BOWLES's travel diaries and scrapbooks; information from the Metropolitan Water Board's Research Assistant; E. A. BOWLES's publications, notably *My Garden in Spring*; an obituary in the *Enfield Gazette and Observer* of May 14, 1954; D. C. A. AGNEW, *Protestant Exiles from France*, 3rd ed. (1886); W. J. COLLINS, "Memorials of the Treacher family" in *Trans. Baptist Hist. Soc.* **2**: 217–235 (1911); H. WAGNER, "The pedigree of Garnault" in *Proc. Huguenot Soc. London*, **11**: 149–151 (1916); W. R. PLOMER, G. H. BUSHNELL and E. R. DIX, *Dictionary of Printers and Booksellers from 1726 to 1775* (1932); W. ROBERTSON, *History of Enfield* (1873); A. W. HILL, *Henry Nicholson Ellacombe* (1919), etc.)

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ADAPTING JOHN INNES COMPOSTS TO GROW ERICAS

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FOR some time we have known that the John Innes Composts were unsuitable for calcifuge plants.[3] In 1947 several tests were started to compare the behaviour of *Erica gracilis* and *E. hyemalis* in J.I. Composts and in composts of peat and sand with or without a little loam added. It was observed that although there was less chlorosis in the peat and sand composts, growth was better in the J.I. Composts. Full-scale experiments were started in 1951 to see whether the J.I. Composts could be adapted to grow ericas without chlorosis and so reap the benefit of the better growth.

The J.I. Composts were modified in two ways. First, the chalk was omitted and secondly, the chalk was replaced by flowers of sulphur at the rates of ¾ oz. and 1½ oz. per bushel. Both JIS and JIP1* were modified in this way and compared with a "grower's" compost of (parts by volume) 6 parts rhododendron peat, 1 part loam and 1 part coarse sand to which no fertilizers were added. *Erica gracilis* was grown as this had proved more sensitive to chlorosis than *E. hyemalis*. It was propagated from cuttings taken in the late autumn or winter and struck in a mixture of equal parts of moss peat and Bedford sand. 450 plants were grown. Growth was measured by cutting the plants at soil level after a season's growth and recording the fresh weight. Chlorosis was estimated by selecting a plant in an intermediate stage of chlorosis and

* JIS = John Innes seed compost. JIP1 = John Innes potting compost No. 1.

comparing all other plants with this. Points were awarded according to the stage of chlorosis reached, a high score indicating severe chlorosis. pH measurements were made using a glass electrode. The results of these experiments are summarized in Table I.

These results show that the addition of sulphur to J.I. Composts reduces chlorosis. If too much sulphur is added, e.g. 1½ oz. per bushel, growth also is reduced. Growth is reduced more in JIS than in JIP1, which contains hoof and horn, indicating that the overdose of sulphur may be causing nitrogen deficiency. ¾ oz. sulphur per bushel seems

TABLE I

Comparing behaviour of *E. gracilis* in adapted J.I. Composts and in a "Grower's" Compost

Compost	Fresh weight gm.	Chlorosis	pH	
			at potting	after cutting
JIS	1,490	53	6·4	6·6
JIS less chalk	1,511	46	5·9	6·2
JIS less chalk + ¾ oz. sulphur	1,606	8	5·7	4·7
JIS less chalk + 1½ oz. sulphur	751	—	5·7	3·9
JIP1	1,021	139	6·5	6·1
JIP1 less chalk	1,153	123	6·0	6·0
JIP1 less chalk + ¾ oz. sulphur	1,719	53	5·7	5·0
JIP1 less chalk + 1½ oz. sulphur	1,483	—	5·8	4·2
"Grower's"	907	30	4·4	4·9

about the right amount to add, especially as it reduces the pH to between 4·5 and 5·5, which is considered a suitable range for ericas. The plants were not fed during the experiment, but in spite of this the growth in JIS was comparable with that in JIP1. Chlorosis was more severe in JIP1 than in JIS and experiments were carried out to discover why this was so.

JIS contains all the materials used for making JIP1 apart from the hoof and horn and the sulphate of potash in the Base fertilizer. Eighty erica plants were grown in JIS and in JIS with hoof and horn, with sulphate of potash, and with hoof and horn and sulphate of potash added at the same rate as for JIP1. Chlorosis was estimated as before and the scores in Table II obtained.

These scores show that the main cause of the severer chlorosis in JIP1 was the hoof and horn added in the Base fertilizer.

Forty-eight of these plants were then used to study the effects of various watering treatments on chlorosis. The pots were watered with solutions of ferrous sulphate and aluminium sulphate at the rate of 1 oz.

TABLE II

Showing chlorosis in JIS to which J.I. Base fertilizers were added separately and together

	JIS	JIS + hoof and horn	JIS + sulphate of potash	JIS + JI Base
Chlorosis . .	8·0	28·0	5·0	39·0
pH . . .	7·1	7·1	7·1	7·2

to the gallon, on April 9, 1953, and the chlorosis scores recorded on April 26.

The ferrous sulphate proved the most effective cure for chlorosis. It reduced the pH slightly more than aluminium sulphate, but as this was not likely to be the only cause of the improvement, it seemed that the ferrous sulphate was also remedying an iron deficiency.

HEINTZE[1] has shown that manganese deficiency is more likely to occur when the level of nitrifiable nitrogen is high, whilst WALLACE and HEWITT[4] and HEWITT and BOLLE-JONES[2] state that iron deficiency may be induced by potassium deficiency. As chlorosis was more severe in JIP1, which contains more nitrogen and potash than JIS, it seemed reasonable to argue that the chlorosis might be caused by manganese deficiency. On the other hand, watering with a solution of ferrous sulphate had produced better results than watering with aluminium sulphate and this was unlikely to have been entirely produced by the slightly greater reduction in pH caused by the ferrous sulphate solution.

There was now contradictory evidence on whether the chlorosis was caused by iron or manganese deficiency. An experiment was carried out in an attempt to resolve this contradiction. Sixty-four chlorotic plants were pruned and fed to encourage new growth and to ensure that nitrogen deficiency was not confused with chlorosis. The plants were then sprayed with 0·1 per cent. solutions of ferrous sulphate and manganese sulphate to which a wetter was added. Thus the effect of the salts could be observed without the picture being complicated by

TABLE III

Showing effect on chlorosis of iron and aluminium sulphate solutions

	Ferrous sulphate	Aluminium sulphate	Control
Chlorosis .	19·0	32·0	48·0
pH . .	6·3	6·5	7·2

alteration in pH. The sprays were applied on September 20, 1953, and chlorosis scored on October 12.

This indicates that the chlorosis of ericas at a pH approaching neutral is due to iron deficiency rather than manganese deficiency. Fig. 79 illustrates the difference in appearance produced.

A final experiment was conducted to compare what seemed to be the best combinations of treatments. As chlorosis very rarely occurred in acid JIS it was decided to use this compost rather than acid JIP1 and to use the flowers of sulphur at $\frac{3}{4}$ oz. per bushel. After the plants had established themselves they would be fed to combat nitrogen deficiency and watered with ferrous sulphate solution to maintain the pH at a satisfactory level. These treatments applied to acid JIS were compared with similar treatments applied to a compost of (parts by volume) 6 parts rhododendron peat to 1 part of Cornish sand to which no fertilizers were added. The plants were propagated in the autumn and potted

TABLE IV

Showing effect on chlorosis of iron and maganese sprays

	Manganese sulphate	Ferrous sulphate
20.9.53 .	89	84
12.10.53 .	102	65

straight into $3\frac{1}{2}$-inch pots on March 15, 1954. They were moved out to frames on June 3. Starting on June 11, some of the plants were watered at fortnightly intervals with John Innes L feed at $\frac{1}{2}$ oz. per gallon and some at monthly intervals with ferrous sulphate at $\frac{1}{2}$ oz. per gallon. Fresh weight, pH and flowering were recorded. Chlorosis was not recorded as all the plants that were fed had a good, green colour. Some of the unfed plants, especially those growing in the peat and sand compost, were pale and yellowish, but this was almost certainly due to nitrogen deficiency. Flowering was estimated by a method similar to that used for chlorosis. On November 29, the amount of withered or brown flowers was also estimated to indicate on which plants the earliest deterioration of flowering was occurring. The plants were cut and weighed on November 30, 1954.

The plants grown in acid JIS were superior to those grown in peat and sand. Plants which had been fed were superior to those unfed, and feeding helped to keep the pH level down. The addition of iron sulphate made very little difference. In fact, there were indications that its addition was depressing the pH below the level for optimum growth, especially when plants were fed also. These differences are illustrated in Fig. 80.

Plants grown in acid JIS flowered earlier than those grown in peat

TABLE V

Showing effect of feeding and acidifying on two erica composts.

	Acid JIS				Peat and sand			
	Fed		Unfed		Fed		Unfed	
	Iron	—	Iron	—	Iron	—	Iron	—
Fresh weight (gm.)* .	753	763	204	208	236	326	57	66
Flowering 20.9.54 .	29	36	56	66	0	0	23	33
29.11.54 .	86	86	60	56	60	50	39	35
Withering 29.11.54 .	20	25	25	26	1	1	20	17
pH after cutting . .	3·6	4·2	5·0	6·0	3·5	3·8	4·1	4·4

* Differences in weight of less than 61 gm. can be ignored.

and sand and unfed plants flowered earlier than fed plants. On November 29, the amount of browning of flowers on plants grown in acid JIS and fed was greater than that on plants grown in peat and sand and fed, but with a little cleaning-up the plants in acid JIS still presented a better appearance. It might be advisable, however, to propagate ericas to be grown in acid JIS in the spring of the same year rather than the autumn of the previous year, so that the flowering season is as late as possible.

It is noteworthy that throughout these experiments the ericas have grown well in certain sterilized composts. Even the propagating compost of moss peat and sand would not be likely to contain the symbiotic fungi normally associated with ericas. The pH levels at which ericas can be grown without chlorosis are also interesting. Chlorosis of *Erica gracilis* is not caused by a rise in pH but by certain factors which may be associated with such a rise. In these experiments ericas were grown in JIS with a pH of 6·6 and showed less chlorosis than ericas grown in JIP1 with a pH of 6·1. On one occasion (Table III), the pH even attained 7·1 with very little chlorosis occurring. Trouble is much less likely to occur at lower pH levels, however, and a pH between 4·5 and 5·0 ensures that chlorosis will not occur and at the same time is not so low as to depress growth seriously.

We recommend that ericas be grown in JIS where the chalk has been replaced by the same weight of sulphur. We propose to call this compost JIS(A). It is emphasized that this compost was prepared from a loam standardized in the stack at a pH of 6·3. Feeding at fortnightly intervals with L feed at ½ oz. per gallon after the plants are stood out is also recommended. If, under certain conditions, e.g. the only water available is hard, the pH rises, then watering with ferrous sulphate at ½ oz. per gallon is a satisfactory corrective.

Other calcifuge species are being tested in JIS(A) and results so far obtained indicate that this compost will also be suitable for rhododendrons. It is too early, however, to make definite recommendations, but it seems that the formulation of JIS(A) will considerably extend the range of plants that can be grown in the JI Composts.

I would like to take this opportunity of thanking Messrs. C. H. & H. W. Stickler, of Southgate, for their advice on how ericas are grown commercially; MR. A. CALVERT who started this work and MR. W. J. C. LAWRENCE for his encouragement and help.

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PLANTS AND PROBLEMS XVIII

SUCKERS ON RHODODENDRONS

Question. In my garden there are a lot of very old rhododendrons and I find that some of the pink- and red-flowered varieties are reverting to the common mauve shade. My gardener suggests cutting out the branches bearing reverted blooms, but I would like to have your confirmation on this point before we make a start.

Answer. The grafting of hardy rhododendrons on a stock of *Rhododendron ponticum* (the common, mauve-flowered species) is generally practised in all rhododendron nurseries. As a result of this, arises the possibility of the stock sending up suckers, and as these suckers come into bloom so there can be created the false impression that the shrub is reverting. When unwanted shoots grow from the base of the plant they should *not* be cut off, for by doing so dormant buds on the suckers are left and, in turn, these will throw forth suckers causing endless trouble.

To deal with suckers, they should be pulled or wrenched away from the stock in the early stages of their development. This practice of wrenching is done by tracing the shoot back to the base of the plant and, if necessary, removing a little of the soil around the roots. Then, by holding the sucker in both hands, it can be wrenched away from the stock by a quick jerk. In cases where the suckers have been

allowed to develop and dominate a grafted variety the plant is best removed and another one put it its place.

CULTIVATION OF RHUBARB

Question. I am proposing to plant some rhubarb this autumn. Please could you give some details on the cultivation of rhubarb and suitable varieties to grow.

Answer. The following points should be noted in the cultivation of rhubarb. The site should be away from shade and protected from the north and east. In the summer, before planting, the land should be fallowed or should grow a crop of early potatoes. Planting should be done in either mid November or early March and 4 ounces per square yard of superphosphate of lime applied over the ground before planting. At the time of planting a handful of coarse hoof and horn should be placed in each planting hole. The plants should be 3 feet apart each way. In the January following planting a dressing of a good mixed fertilizer should be given at 3 ounces per square yard. No sticks should be pulled the first year. In subsequent years pulling may be carried out, but never pull too many sticks from any one plant. Two dressings of potassium nitrate should be given at the rate of 1½ ounces per square yard in April and again in late June.

The plants should be dug up and split up every six years. The following varieties have given good results in the trials at Wisley:

Early Variety	*Maincrop Varieties*
Timperley Early	Crimson Queen
	Hawke's Champagne
	Macdonald
	Valentine

APPLES—PRE-HARVEST DROP

Question. Many of my apples always drop just before they are fully matured and coloured. This means that I have to put up with using windfalls or have to pick them long before they are ready. Is there anything I can do to prevent such premature dropping of fruit?

Answer. Such falling of fruit is known as the pre-harvest drop and is more prevalent in some varieties than others, particularly 'Beauty of Bath.' A spray is now available which, under suitable conditions, will greatly reduce such premature dropping. If it is applied seven to ten days before fruit normally starts to drop it should prove successful although weather conditions will influence the extent of this. In particular a warm day is best for applying the spray. Not only is pre-harvest drop reduced but also the season of any one variety is extended and the fruit is well coloured and of good quality. Extremes should be avoided since, if picking is delayed too long after spraying, the fruits may split and will be found to have lost much of their flavour.

Various proprietary brands of Pre-Harvest Drop sprays are now on the market, and it is, as always, most important to follow the maker's instructions.

PRUNING SWEET CHERRIES

Question. A garden we have recently acquired contains some quite large sweet cherry trees. These have fruited satisfactorily but they appear far too crowded with branches. Can you please tell me when to prune these?

Answer. Sweet cherries should be pruned as little as possible—the less the better. However, where crowded or crossing branches occur these should be thinned out, removing them any time after fruiting up to late August. Pruning at this period reduces the risk of Silver Leaf infection through the pruning wounds, although these should always be pared off cleanly and painted over with thick white lead paint. Where branches are very crowded it is wise to spread their removal over at least two years. This not only reduces the number of wounds made at any one time but also avoids the possibility of upsetting the balance of the tree. Needless to say, any dead, diseased or broken branches should be removed at the same time.

DELPHINIUM LEAF BLOTCH

Question. How serious is the delphinium disease called Black Blotch?

Answer. The disease of delphiniums known as Black Blotch and due to attack by the parasitic organism *Pseudomonas delphinii* appears on the leaves as inky black irregular-shaped spots in size up to an inch across. Some spots may appear also on the stems and the plant is often very disfigured. In America, spraying the young shoots and the surface of the soil around the plant with Bordeaux mixture is recommended, but we have never been able to get a good control of this disease at Wisley. In our view there is great contrast between the reaction of the different delphinium varieties to this trouble; some varieties being very susceptible and severely affected while others nearby remain unaffected. We therefore advise that a variety which is repeatedly and severely attacked should be discarded, although, if you wish, you could try the early spraying with Bordeaux mixture or Colloidal Copper.

POTATO BLIGHT

Question. I need all the composting material I can get but I am told not to keep old potato tops for fear of encouraging Blight disease. Is this correct?

Answer. We do not consider that there is much, if any, danger in using potato haulm for the compost heap, and the possibility of blight being carried forward from this source is negligible, especially if you make a good compost heap which heats properly. The main source of infection from which blight commences in any season lies in slightly

infected tubers either planted as seed or those left in the ground, which we call "ground keepers," "self-setters" or "volunteers." The fungus causing Blight disease does not usually overwinter in the soil or on the debris of the tops.

POTATO ROOT EELWORM

Question. For the last two years our potato crop has failed. The plants gradually turn yellow and remain dwarfed and there is a reduction in yield. I enclose a specimen for your examination.

Answer. The potatoes are severely infested with the potato root eelworm, *Heterodera rostochiensis*. The young microscopic eelworms invade the root tips and later the female worms commence to swell. The distended body becomes full of eggs, the body wall hardens and the worm dies. The structure remaining, which is just visible to the naked eye, is termed a "cyst." It is at first white in colour but later darkens to brown. The cysts contain many hundreds of eggs which are able to remain viable in the soil for a number of years.

There is no way of controlling this eelworm chemically, and plants which are susceptible to attack should not be grown on known contaminated land for at least five years. Fortunately, the eelworm only attacks Solanaceous plants, of which potatoes and tomatoes are the only ones of economic importance. In a small garden probably the whole garden is infested, in which case it would be advisable to refrain from growing either of these crops for five years. In a larger garden it is possible to avoid trouble in future by adopting a rigid five-year rotation providing only clean stock is planted.

LEAFCUTTING BEES

Question. For the last two years I have been troubled by what I believe to be leafcutter bees making their nests in my pots of succulents. Is there anything I can do to get rid of them, as nearly every pot is affected?

Answer. The leafcutter bees, *Megachile* species, choose various sites, such as decaying wooden posts, rotting tree stumps, brick walls or the ground, in which to make their nests. Frequently the sandy soil of potted succulents or cacti is utilized. Having selected a suitable site the bees proceed to cut out oblong or circular pieces of leaves from such plants as roses, rhododendrons, lilac, privet and laburnums. By means of the leaf portions they construct a series of cigar-shaped cells, each one being placed on top of the other. The cells are filled with a mixture of pollen and honey which serves as an adequate supply of food for the larva which hatches from the single egg laid in each cell.

In future an infestation may be prevented either by placing wire gauze over the glasshouse ventilators to prevent the bees entering or by dusting the soil with 5 per cent. BHC dust at the first sign of attack in order to deter them.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1955

Cytisus × beanii F.C.C. May 3, 1955. A very beautiful hybrid raised at Kew in 1900 from the cross *C. ardoinii* × *C. purgans*, forming a deciduous, procumbent shrub about 18 inches high. At the flowering season it is completely covered by innumerable Canary Yellow (H.C.C.2) flowers. Exhibited by the Director, Royal Botanic Gardens, Kew (Fig. 77).

Rhododendron davidsonianum (pink form) **F.C.C.** May 3, 1955, as a hardy flowering plant. The pink form of this Rhododendron received an **A.M.** on April 30, 1935, when shown by the late Lord Aberconway, and is fully described in R.H.S. JOURN. **60,** 323 (1935). An erect growing species with elliptic leaves, densely covered with brownish scales below. Inflorescence a rather open flat-topped truss of about seven flowers; corollas rotate 4·5 to 5 cm. across, tube narrow funnel-shaped about 1·5 cm. long, lobes unequal, the three upper spotted red-brown on the inside, otherwise a pure pale rose. Exhibited by Lord Aberconway and the National Trust (Fig. 82).

Tritonia crocata 'Princess Beatrix' A.M. May 24, 1955. A brilliant Fire Red (H.C.C. 15) variety of this useful bulbous plant usually grown in a cool greenhouse in most parts of the British Isles. Its flowers, which measure from 2 to 2¼ inches across when fully expanded, are freely produced in racemes and have a dark oval patch at the base of each of the rounded segments. The stems are well over a foot in length so that this variety is very suitable for cutting. Raised in 1939, introduced and shown by Messrs. C. G. van Tubergen Ltd., Zwanenburg Nurseries, Haarlem, Holland (Fig. 81).

ORCHIDS

× **Angulocaste (Apollo G.) 'Wyld Court' A.M.** March 22, 1955. The parentage of this plant is *Anguloa clowesii* and *Lycaste* × *imschootiana*. A large plant bearing five flowers, each 4 inches by 2 inches was exhibited. The flowers are deeply cup-shaped with the inner lateral tepals held almost vertically beside the upward pointing labellum. The basic colour is pale yellow, dotted with pale red inside, the dots concentrated in the labellum, and the latter also having a red blotch at its base. Exhibited by Dr. W. Stirling, Whatcroft Hall, Northwich, Cheshire.

Cattleya (Bob Betts G.) 'Excelsior' A.M. March 22, 1955. *C.* 'Bow Bells' and *C. mossiae* var. *wageneri* are the parents of this popular grex. This cultivar has a very large bloom 6 inches by 7 inches, and again the general colour is white with brownish-yellow in the throat. The two lateral tepals of the inner whorl are very large and flat while the dorsal tepal is emarginate. The labellum is markedly cylindrical towards the base. Exhibited by Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells.

Cattleya (Bob Betts G.)'Majestic' A.M. February 22, 1955. The cross *C.* 'Bow Bells' and *C. mossiae* var. *wageneri*, which resulted in the 'Bob Betts' Grex has now produced four Award of Merit plants. This latest cultivar, named 'Majestic,' has again resulted in a *Cattleya* of very large size and rather flat shape. The flower exhibited was 6½ by 6½ inches, and the colour is again almost completely satin-white with a yellow throat. Exhibited by Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells.

Cattleya (Lady Moxham G.) 'Southern Cross' A.M. May 24, 1955. A large-flowered cultivar produced by crossing *C.* (Evelyn Sander G.) 'Carrie' with *C.* 'Cokeham.' The basic colour is mauve upon which a velvety rose is superimposed towards the apices of the lateral tepals and the labellum. The upright tepal is narrow. The downward pointing laterals are strongly fimbriated towards the apex. A yellowish throat occurs in the labellum. Exhibited by Messrs. Stuart Low & Co., Jarvis Brook, Sussex.

Cattleya (Bob Betts G.) 'White Wings.' A.M. March 22, 1955. Another cultivar from the 'Bob Betts' grex which has resulted in a number of awards. The parentage is *C.* 'Bow Bells' and *C. mossiae* var. *wageneri*. The plant exhibited bore two flowers each 6½ inches by 6 inches. The white tepals are strongly fimbriated and the throat of the labellum is brownish-yellow. The lower part of the labellum is more flattened than others of this cross. Exhibited by H. W. B. Schroder, Esq., Dell Park, Englefield Green.

Cymbidium (Dorama G.) 'Charm' F.C.C. April 19, 1955. The parentage of this cultivar is *C.* 'Dorchester' × *C.* 'President Wilson.' A spike bearing five flowers, each being 5 inches across, was exhibited. The labellum of this plant stands out from the large tepals more noticeably than is usual in the cymbidiums. The dorsal tepal is incurved, enhancing the broad appearance of this plant. The basic colour is cream, but a tinge of pink appears, especially towards the centre. The labellum in addition has a dark red band towards the outer margin. The column is orange-brown. Exhibited by Messrs. McBean's Orchids Ltd., Cooksbridge, Sussex.

Cymbidium (Vieux Rose G.) 'Encore' F.C.C. March 22, 1955. Another cultivar from the cross *C.* (Rio Rita G.) 'Radiant' with *C.* (Babylon G.) 'Castle Hill.' This plant was exhibited with a spike of ten flowers, each flower being 4 inches by 3 inches. The tepals are pink with a narrow white margin. The dorsal tepal is incurved. The wide labellum has dark reddish markings, and especially a line down the centre of the lip. A yellowish area extends around the crest towards the apex of the labellum. Exhibited by H. W. B. Schroder, Esq., Dell Park, Englefield Green.

Cymbidium (Vieux Rose G.) 'Exquisite' F.C.C. March 22, 1955. Eight blooms on a large spike of this cultivar were exhibited, with individual flowers 4 inches by 3½ inches. The parentage is *C.* (Rio Rita G.) 'Radiant' crossed with *C.* (Babylon G.) 'Castle Hill.' The basic

colour of the tepals is a striking deep rose-pink, while darker streaks and dots occur towards the centre. The labellum has dark red markings which form an irregular band towards the margin. A yellow crest is present. Exhibited by H. W. B. Schroder, Esq., Dell Park, Englefield Green.

Cymbidium (Vieux Rose G.) 'Flush' A.M. April 19, 1955. This cultivar is another member of the 'Vieux Rose' grex, which has already produced two First-class Certificate plants this year. This latest cultivar has rosy-pink tepals with darker longitudinal streaks. The creamy labellum bears dark red spots concentrated towards the apex. The crest is yellow and the column is tipped with dark red. Exhibited by Lt.-Col. The Lord Hothfield, Castle Hill, Englefield Green, Surrey.

Cymbidium (Cariga G.) 'Golden Glory' A.M. March 22, 1955. This cultivar has basically golden flowers with a tinge of brown on the reverse, which is slightly visible on the inner side. Faint markings occur on the veins. The labellum is primarily creamy-yellow, but towards the apex especially are prominent dark red markings. The plant exhibited bore a spike of eight large closely set flowers, individually 5 inches by 3½ inches. The parentage is *C.* 'Carlos × *C.* 'Riga.' Exhibited by Messrs. McBean's Orchids, Ltd., Cooksbridge, Sussex.

× **Laeliocattleya (Ewelme G.) 'Eva' A.M.** March 22, 1955. This plant was obtained by crossing *Lc.* 'Princess Juliana' with *Lc.* 'Princess Margaret.' A large flowered cultivar has resulted, with very wide lateral tepals, and narrow tepals of the outer whorl; the basic colour is light purple, but the labellum is predominantly a bright velvety magenta, with pale yellowish streaks towards the base. In addition the labellum is strongly fimbriated around the apex. Exhibited by W. Aldridge, Esq., Benson, Oxford.

× **Odontioda (Bunty G.) 'Whatcroft' F.C.C.** March 8, 1955. ×*Odontioda* 'brewii' and *Odontoglossum* 'St. James' produced this large-flowered cultivar. The plant exhibited bore eight flowers closely packed on one spike, individual flowers being 3½ inches by 3½ inches. The colour of the tepals is a basic Maroon (H.C.C. 1030/1) on which a little brown is superimposed in places. Each tepal has an irregular band of white or pale mauve along its undulated margin. The labellum is more glossy, with a wider margin and a yellow crest. Exhibited by Dr. W. Stirling, Whatcroft Hall, Northwhich, Cheshire,

Odontoglossum (Royal Serenade G.) 'Britannia' A.M. February 22, 1955. A spike of nine closely clustered flowers of this plant was exhibited, each flower being 3 inches by 2¼ inches. The parentage is *O.* 'Amphion' × *O.* 'Dauphin.' The brownish-purple blotches cover most of the tepals, but a broad white margin is present. especially towards the apex. The labellum has a yellow crest, and the surrounding area is also suffused with yellow. Exhibited by Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells.

Odontoglossum (Sunfly G.) 'Lyoth Delight' F.C.C. May 24, 1955. This handsome cultivar has very large primrose-coloured flowers

with individual blooms 4 inches by 4 inches. The spike exhibited had six flowers. The tepals are all strongly scalloped and have undulating margins. The small labellum has a white margin and has numerous red dots. Parentage is *O.* 'Sunglow' and *O.* 'Brimstone Butterfly.' Exhibited by Messrs. Charlesworth & Co. Ltd., Haywards Heath, Sussex.

Odontoglossum (Sunfly G.) 'Lyoth Gleam' A.M. May 24, 1955. Another cultivar from the *O.* Sunglow' and *O.* 'Brimstone Butterfly' cross. The plant exhibited bore a graceful arching spike of nine flowers. The latter have similar primrose-coloured flowers to 'Lyoth Delight' but individual blooms are smaller. Odd tepals possess a singular reddish blotch, while the labellum is blotched rather than spotted. Exhibited by Messrs. Charlesworth & Co. Ltd., Haywards Heath, Sussex.

Odontoglossum (Canopus G.) 'Regal' A.M. February 22, 1955. *O.* 'Crowborough' and *O.* 'Derwent' are the parents of this plant. A spike of flowers, each $3\frac{1}{4}$ inches by 3 inches was exhibited. The outer tepals are basically brown and mauve, while a maroon and mauve shade seems to predominate on the inner tepals. In addition a pale mauve margin is present. A yellow crest occurs on the labellum. Exhibited by Messrs. Stuart Low & Co., Jarvis Brook, Sussex.

Odontoglossum (Aldonia G.) 'Stonehurst' A.M. April 19, 1955. A large-flowered cultivar of the *O.* 'Alperor' and *O.* 'Tordonia' cross. Individual flowers are $4\frac{1}{2}$ inches by 4 inches and the plant exhibited possessed a spike of five flowers. The basic colour is mauve, which occurs in irregular large blotches over the tepals, and fades to white at the margin. The labellum is clear white in the lower part with a yellow crest in the centre. The column is pale yellow with purplish blotches. The large lateral tepals and the labellum are strongly fimbriated. Exhibited by R. Strauss, Esq., Stonehurst, Sussex.

× **Oncidioda (Crowborough G.) 'Chelsea' A.M.** May 24, 1955. This cultivar resulted from the multigeneric cross × *Odontioda cooksoniae* and *Oncidium auriferum.* A long curved spike with many flowers, each 3 inches by 3 inches, was borne by the plant exhibited. The colour is basically a dark red, but the laterals become predominantly speckled with orange towards the apex. The strongly reflexed labellum is dark red with a yellow tip. Exhibited by Dr. W. Stirling, Whatcroft Hall, nr. Northwich, Cheshire.

Phalaenopsis (Clara I. Knight G.) 'Wright' A.M. April 5, 1955. This large-flowered *Phalaenopsis* cultivar was exhibited with a spike bearing five open blooms and four buds. Individual blooms were 3 inches by 3 inches. The general colour is a pale pinkish-violet. Prominent are the wide flat lateral tepals, while the labellum has two linear incurved appendages arising from the apex. On the two segments of the labellum are reddish spots, and the crest is yellow spotted with red. Parentage, *P.* 'Marmouset' × *P.* 'Doris.' Exhibited by H. D. Wright, Esq., Box 146, Route 13, Birmingham, Alabama, U.S.A.

BOOK NOTES

"Plant Regulators in Agriculture." Edited by H. B. Tukey. 269 pp. Illus. (Chapman & Hall.) 44s.

This symposium, by a number of experts in the field of agriculture and horticulture is intended to present, in a way that the scientific layman can understand and appreciate, the nature, significance, mode of action and use of the so-called plant growth "regulators." Although the final chapter is on apparatus for the application of these materials, the text does very largely avoid, as intended, " routine formulas, narrow recommendations and over simplified directions." It only partially succeeds, however, in its main task and this is very largely the inevitable result of the symposium technique of book-writing. It suffers from a surfeit of experts, many of them with competing interests, and is thus sprinkled with overlaps. Some of the individual chapters are excellent, having been introduced, as the editor intended, with elementary facts and principles and the relevant aspects of plant growth control by chemicals developed in a logical and interesting manner. The chapters on parthenocarpy, abscission, fruit maturation and weed-killing in the tropics were in this category and it is to be regretted that the book could not have been composed of fewer but more comprehensive surveys of this quality, each covering one major aspect of plant growth control. The book seems therefore to lack a unifying theme and thereby loses considerably in interest and in the power to enlighten the layman.

It does, however, represent a very comprehensive survey of the modern methods of plant growth control by synthetic chemicals. The full range of topics discussed are root induction, control of flowering and fruiting, regulation of abscission of leaves, flowers and fruit, problems of fruit and vegetable storage, plant breeding and weed-killers. It will undoubtedly be of great interest and value on the other side of the Atlantic, but its value in other parts of the world is a little less certain since attention has been paid only to American crops and those compounds extensively used or investigated in America. Thus only one page out of a total text of well over two hundred pages is given over to weed control in small grain cereals, a subject of major concern to European farmers. A possible addition to its usefulness would have been the inclusion of Latin names to supplement the common American names for some of the widely grown crop plants.

The book is well produced. The format is pleasing and there are many excellent photographic and line illustrations. Tables, giving details of plant responses to specific regulator treatments, although dealing only with plants in America, will undoubtedly be of interest to readers in other parts of the world where many of these plants also occur.

L. J. AUDUS

"Maintenance of Horticultural Equipment." By P A. Reynolds. 183 pp. (George Allen & Unwin Ltd.) 16s.

For the grower or amateur gardener who anticipates the purchase of a mechanical cultivator, electric light installation, or domestic water supply, this book will be useful. It covers a wide range of subjects dealing especially with the maintenance of a small two- or four-stroke petrol engine. It describes exactly how to do a particular job, and the author is to be congratulated in putting in those simple things which the expert usually assumes the reader to know. There is a chapter on Electricity which would not satisfy an electrical engineer but, no doubt, will enable a reader with some previous knowledge to understand a simple electrical system. Chapter 10, on Water Supplies, could have been extended to cover the requirements of an irrigation or glasshouse system. The subject of boilers and oil burners is touched upon too briefly and it is quite possible that Chapters 3, 12 and 13 could well have been left out because these subjects are dealt with fully in other books, whereas the problems of glasshouse heating and irrigation are special to horticulture and have not been dealt with sufficiently. Rust is rightly placed as contributing to implement deterioration but little has been said about adjusting cultivating implements to ensure efficient operation in the field to avoid untimely wear. Photographs, which are placed at the end of the book, could have carried also a reference to the page on which the subject-matter is dealt with.

A book which most growers should have in their offices, but the amateur gardener who is also machine minded, will not find it very useful; if he is not machine minded he will probably not have many machines to go wrong and if they did he would most likely send them to be repaired.

E. R. HOARE

"Soil Chemistry." By M. Y Shawarbi. 420 pp. (Chapman & Hall.) 32*s*.

The further gardening moves away from traditional precepts, the more essential it is to know and understand the scientific principles guiding modern practice. It is in this sense that this survey of the chemical and biological processes of the soil provides helpful reading. As a student's textbook it is primarily theoretical and general, covering the world's soils more from the agricultural than the horticultural point of view. Nevertheless, Dr. Shawarbi presents his highly technical subject-matter concisely and in simple, easily understood language, and is especially rewarding on such matters as colloids, ionic exchange, minor elements and analysis, so rarely discussed in everyday gardening books. There is a large bibliography, though apparently the author has drawn upon sources other than those cited.

"An Irish Flora." By Prof. D. A. Webb. 2nd Edition. 250 pp. (Dundalgan Press, Ltd., Dundalk.) 1953. 13*s*. 6*d*.

It is a curious fact that a land which possesses so much unspoiled countryside should have a population largely indifferent to the study of plants. Irish botanists have been few, perhaps because, as Prof. Webb remarks, "The Irish are more interested in words and names than in material objects," or perhaps the charms of meadow and heath mean more to a city population than to country folk who have known them from childhood. It should, however, be remembered that, until recently, Irish schools had done little to foster a general interest in botany, partly for historical reasons, but more especially for want of a book which would guide the beginner without burdening him with information concerning plants which could only be seen "across the water." Prof. Webb went far towards meeting this want in the first edition of his Flora (1943) and now offers us a revised edition, containing those species which had been omitted or merely listed in the original work. The result is wholly satisfactory, and in a neat little volume we have the gist of all that is known concerning the Irish flora, with clear keys and descriptions to help with identifications.

English readers will immediately note some of the peculiarities of Irish vegetation—the rareness or absence of *Scabiosa columbaria*, *Adoxa*, *Geranium pratense*, *Mercurialis perennis* and many other well-known plants, but who will complain when *Pinguicula grandiflora*, *Daboecia cantabrica* and *Dryas octopetala* can colour a landscape. Ireland is, truly, an unpredictable land, and what greater attraction can any country offer to a botanist than the chance of finding the incredible.

R. D. MEIKLE

"The American Gardener's Book of Bulbs." By T. H. Everitt. 244 pp Illus. (Random House Inc.) $5.95.

A gaudy dust-cover often disappoints in the contents, but those who do not know that Mr. Everett's reputation guarantees something good, should not be deterred from perusal by the one on this book.

Its object is the popularization of bulb culture in America and this is all to the good. It is to the gardeners in the U.S.A. who have done so much for certain genera, that we must look for still greater developments in the future in this aspect of gardening, for they have the energy and the wealth to exploit every aspect of this fascinating pursuit.

As this book is for American gardeners it covers a range of climate far greater than our own but it can be read with profit as it deals with all aspects of cultivation whether in garden, greenhouse or room.

The writing is clear and succinct. I myself received great pleasure from the historical notes and great profit from the section on raising bulbs from cuttings, a system new to me and probably to many others. Also of great interest is the insistence on the desirability of using a good proportion of organic matter in the composts and the regular feeding of bulbs, with both of which I heartily agree.

Moreover, the compact, precise and excellently planned encyclopaedia added to my knowledge in many ways; it is a model of how to do the job where a full dictionary is not called for. It also gives information, often wanted and as often omitted, on the time bulbs take to flower from seed and, no less important where it is material, the optimum storage temperature. My only comment is that we could do with more of this valuable information.

The book is profusely, not to say luxuriously, illustrated from colour photographs. As in all such reproductions at present, they vary from excellent to poor, but Mr. Everett knows as well as I which are good representations of the subject.

As an amateur photographer I feel I must pay a compliment to those of *Lilium auratum*, *Anemone blanda*, and the perfectly lovely picture of naturalized grape hyacinths. Not for the picture but the interest, one must exclaim on the group of *Sanguinaria canadensis multiplex* showing at least 200 blooms!

To complete the circle there is a chapter on flower arrangement on which I do not feel competent to comment beyond saying that from what I have seen, arranging the flowers of bulbs is the most difficult aspect of the art.

Alas! to those of us who possess only a few of our poor miserable depreciated pounds this book will be rather expensive.

E. B. ANDERSON

"Plants Indoors." By Mary Noble and J. L. Merkel. (D. Van Nostrand Co. Inc.; Macmillan & Co. Ltd.) 52*s*. 6*d*.

Most American books on this subject are over-enthusiastic, and recommend numerous plants which are normally seen in the stove-house, needing conditions few of us can emulate indoors. *Plants Indoors* is no exception, recommending orchids and stating, for example, "Episcias are Gesneriads like African Violets and Gloxinias and just as easy to grow." It does, however, state quite fairly the basic problem of growing plants in rooms, and its section on culture is excellent, as is that on pests. The rest of the book is divided into chapters on different kinds of plant, and these are decidedly patchy. Some of the descriptions are good, as, for example, those of the exciting philodendrons, many of which we have not yet seen over here; but others are so brief as to be useless, like that of *Schefflera*—"a good dark green plant." The Latin names are not all that they might be, while the style is somewhat chatty, though not unpleasantly so.

Despite my criticisms, and as long as one takes a large pinch of salt with the criterions of ease of culture, this is a useful book for the enthusiast—I would not recommend it to the beginner—for it will at least show him how many more plants can be tried, and I hope it may encourage nurserymen to import some of them. The numerous illustrations, including two colour plates, are first-rate, and I should want a copy just for these.

A. J. HUXLEY

"Wild Flowers and How to Grow Them." By Edwin F. Steffek. 192 pp. Illus. (Crown Publishers, Inc., 419 Fourth Avenue, New York City 16.) $3.95.

The author of *Wild Flowers and How to Grow Them*, concerned at the destruction of the wild flowering plants of the United States by the march of what he terms "our so-called civilization," has written this book to draw attention to this danger and to indicate how the ordinary gardener may help in a policy of "conservation." This may be summed up roughly by saying that if native plants are not to survive in the wild, they may at least be given the opportunity of surviving in American gardens. My impression is that Reginald Farrer said something on the same lines to justify collecting scarce Alpine plants in Europe for English gardens. It is certainly to be hoped that this book may succeed in its purpose. It indicates the correct methods of collecting, cultivating and propagating some 350 species, and the author may find some consolation in the fact that many of them have for years been growing happily in British gardens.

MORTON

"Cacti." By A. Bertrand and A. Guillaumin. 2nd English edition. 94 pp. Illus. (Crosby Lockwood & Son, Ltd.) 1955. 16*s*.

The French book *Cactées*, by A. Bertrand and A. Guillaumin, was published in 1949; it gives the classification of the Cactaceae in a simple but scientific manner, the cultivation of the plants is described and this excellent little book has a number of colour plates as well as others in black and white. An English translation with the same illustrations appeared in 1952 and has proved so popular that a second edition is now available; in this the English text has been improved by revision and the illustrations have been changed. The new ones, however, are in the same style; seventeen are in colour, thirty-seven in monochrome, all from photographs taken by A. Bertrand. Anyone interested in growing Cacti and in the classification of the different kinds, will find this a most helpful book.

V. HIGGINS

"Die Baumschule: ein Handbuch für Anzucht, Vermehrung, Kultur, und Absatz der Baumschulpflanzen. By Gerd Krüssmann. Zweite Aflage. Berlin. Paul Parey. 1954. viii + 559 pp., figs. 10 ins. 44 D.M.

This second edition is revised and extended by 126 pages to include much new material, both in the general section on arrangement and methods in tree nurseries, diseases and pests and counter-measures against them, and also in the descriptions of individual genera which occupy the greater part of the volume. Liberal photographs and drawings add to the value of a comprehensive textbook on the commercial propagation of trees, shrubs and conifers.

"Ornamental Shrubs and Trees for Gardens in Southern Africa." By Una van der Spuy. 254 pp. Illus. (Juta & Co., Ltd., P.O. Box 30, Cape Town.) 21s.

Mrs. Van der Spuy is to be complimented on producing a handy book of reference which will fill a long-felt want among South African gardeners. It is designed mainly for the small gardener who is unscientific and rather allergic to Latin names, although a most helpful list explaining Latin meanings is included.

There are comprehensive lists of trees and shrubs suitable for each of the many differing climatic conditions to be found in South Africa and a rather novel feature is the lists of shrubs grouped according to their flowering period, a detail so often forgotten in planting schemes..

But chief credit must go to Mrs. van der Spuy for her unashamed advocacy of the use of the native flora in South African gardens. South Africa is unusually rich in beautiful flowering trees and shrubs as well as in bulbous plants, aloes, etc., but they are sadly neglected in most South African gardens. Mrs. van der Spuy includes a goodly number of indigenous trees and shrubs in the alphabetical list where the amateur gardener may learn what he wants to know about them. This list is profusely illustrated with most useful line drawings. For those unacquainted with the Latin name of the plant they wish to look up there is an index.

If a criticism may be permitted it would refer to the inclusion in this book of illustrations of formal gardens at the Chelsea Show and of formal designs for English suburban gardens. Even though an effort has been made to acclimatize these latter by suggesting lists of plants suitable to the South African climates they still have an incongruous appearance in this setting. On the other hand there are one or two beautiful illustrations of South African flowering shrubs.

LEWIS PALMER

ERRATUM

Dianthus 'Inchmery White,' described in Wisley Trials, R.H.S. JOURNAL 80, 287 (June 1955).

We have been informed that this name is incorrect and it should be *Dianthus* 'White Inchmery.'

ORDERS FOR BOOKS

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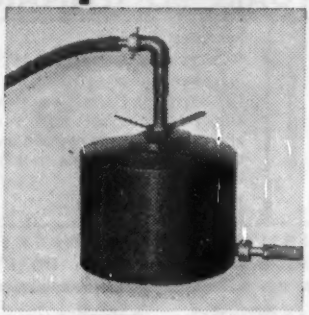

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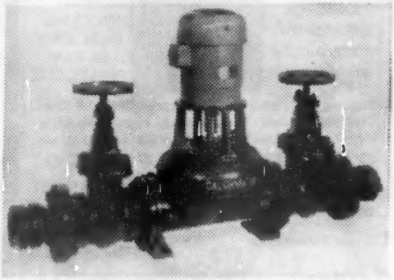

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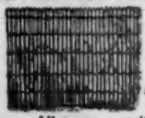

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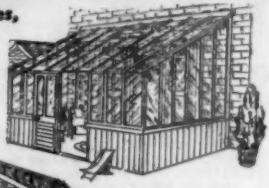

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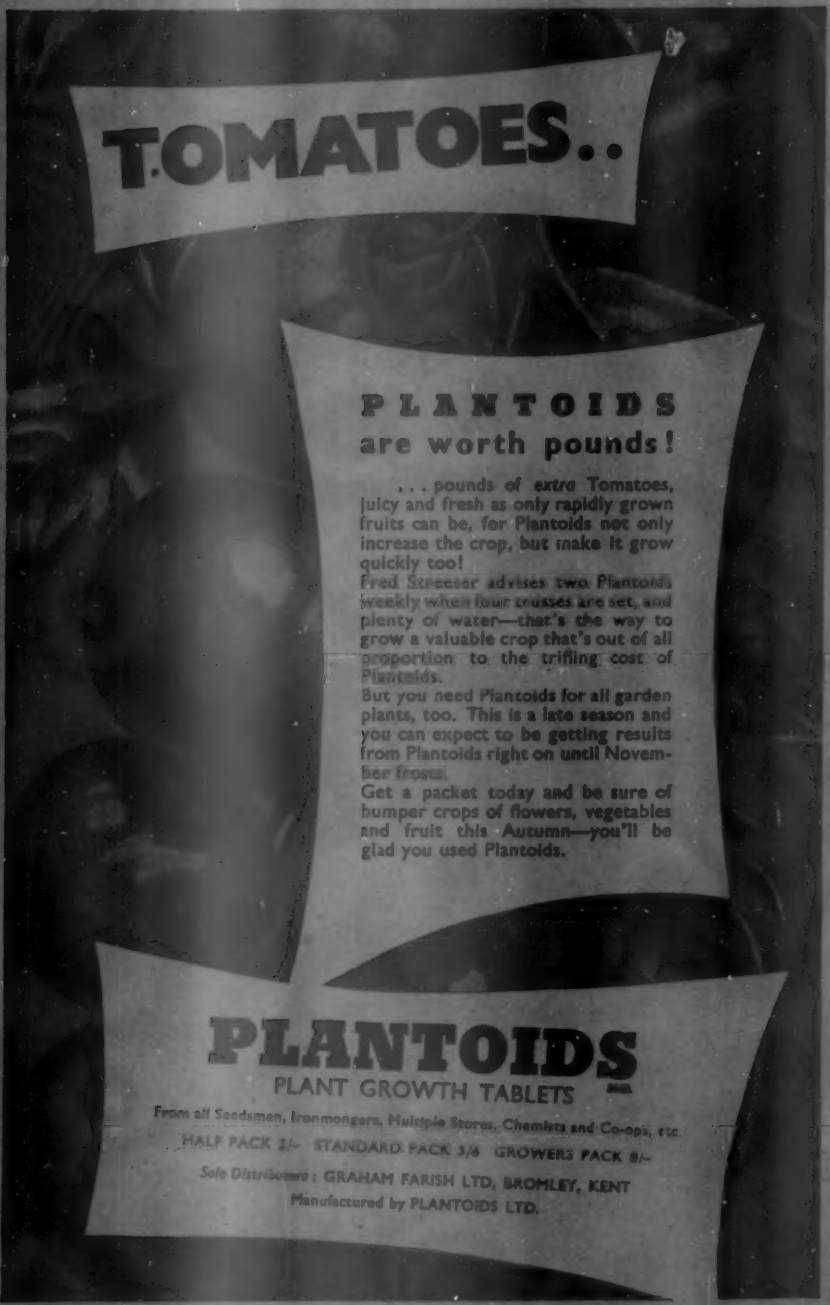
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